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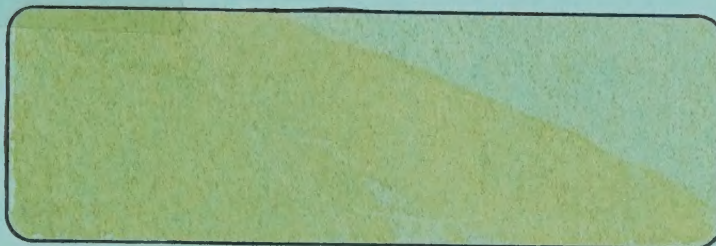
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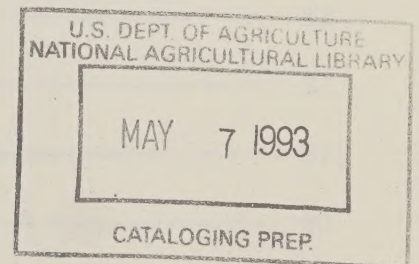
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A Report of Biological Data Developed in 1978 for the
Optimum Pest Management Trial, Panola and Pontotoc
Counties, Mississippi

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Summary

The Optimum Pest Management Trial (OPM) in Panola County, Mississippi, conducted concurrently with the Boll Weevil Eradication Trial in North Carolina and Virginia, began in 1978. The objectives are to develop data which will make possible evaluations of the biological, economic and environmental impacts of the two programs if they are used across the Cotton Belt.

Sixty-four fields in Panola county and thirty-two fields in Pontotoc county were monitored for insect (pest and beneficial), spider mite, and spider populations. They were monitored weekly with twenty and ten fields, those, also, monitored in 1977, being monitored semi-weekly in Panola and Pontotoc Counties, respectively. The fields monitored in Pontotoc County are used to compare a Current Insect Control (CIC) program with that of the OPM Trial in Panola County. Dynamic crop information such as weather, fruiting, missing fruiting forms, plant height, rooting depth and main stem nodes were recorded and petioles for nitrogen analyses were collected. Static crop information such as planting date, cultivar, row-spacing, soil types, peripheral ecosystems, insecticide applications and yields were recorded. All data taken were coded on special computer forms and were processed by the Mississippi State University Computer Center with special handling for data analyses accomplished at the Stoneville computer terminal.

Most growers in both counties planted systemic insecticide treated cottonseed and less than one third of all fields were treated with conventional insecticides for thrips control.

Cotton aphid, spider mite, cabbage looper, cotton fleahopper, beet armyworm, yellowstriped armyworm, fall armyworm and leafhopper infestations were generally light. Whiteflies increased in most fields by the end of the season but population buildup was too late to cause damage.

Boll weevil survival was low because of severe weather during the winter of 1977-78. Boll weevil populations in surface woods trash collected and inspected in December, 1977, averaged 3874 and 3024 per acre in Panola and Pontotoc Counties, respectively, with none being found in the same sites in March, 1978. Extrapolation of trap catches based on trap efficiency indicated a population of 70,000 boll weevil adults on 32,500 planted acres or only two per acre. Because of the low survival, population build-up was slow and only 300 of the 32,500 acres in Panola County were treated for boll weevil control per se although insecticides applied for bollworm - tobacco budworm control may have precluded treatment in some fields. Four applications of methyl parathion for diapause control made in September and October were effective in reducing the boll weevil population in Panola County. Surface woods trash samples collected and inspected in December averaged 430 and 1532 boll weevils per acre in Panola and Pontotoc Counties, respectively, indicating a reduction in the number of boll weevils that entered hibernation sites in Panola County which had received insecticidal treatment for control of diapausing weevils.

Tarnished plant bug infestations were light in both counties with no insecticides being applied for control. Populations of the clouded plant bug were higher in both counties than usual with increased

numbers occurring in the latter part of the growing season.

Populations of both species were somewhat higher in Pontotoc than in Panola County. Population estimates made with the D-Vac sampling technique were much more efficient than those made with the sweep net or terminal bud inspection techniques with little difference between estimates made with the two latter methods.

Bollworm - tobacco budworm complex populations were light to moderate in both Counties. Averages of 1.9 and 0.9 applications of insecticides for their control were made in Panola and Pontotoc Counties, respectively, comparing with 3.9 and 1.6 insecticide applications in 1977 indicating higher infestations in that year. Infestations were lighter in Pontotoc County in both years probably because of less favorable weather conditions. The nonuse of insecticides for lygus bug control in 1978 may have helped reduce bollworm - tobacco budworm infestations since the use of insecticides in the early fruiting period kills off beneficial insects leaving the crop vulnerable to subsequent attacks of the pests.

The predaceous insect population was much lower in the two counties in the beginning of the 1978 season than in 1977 and peaked later in the season at about one half of the 1977 numbers. In 1977 and 1978 the most important predator was the big eyed bug followed by the insidious flower bug, the convergent lady beetle, the spotted lady beetle, the green lacewing, a nabid (Reduviolus roseipennis), and a lynx spider (Oxyopes salticus). The previously reported decline in beneficial arthropod populations in mid-August occurred in 1978. However, a resurgence in populations occurred, thereafter, especially

in Pontotoc County. Rainfall, after the plants matured, caused the plants to regrow and set fruit. Thus, it appears that beneficial arthropod populations may be tuned to the physiology of the cotton plant. Growing and fruiting plants favor population development while mature plants do not.

Use or nonuse of insecticides for control of early-season pests has an influence on beneficial arthropod populations and on subsequent Heliothis spp. populations. In Panola County, all growers ignored the early July Heliothis spp. populations. Fields receiving no early treatment received an average of two applications of insecticides later in the season; those receiving foliar applications of insecticides early in the season received an average of 2.5 applications; those receiving in-furrow at planting applications of aldicarb received an average of 4.2 applications; and the only field that received both aldicarb and conventional treatment received 4 applications. Yields, in the fields receiving late treatment, averaged 680 pounds of lint per acre versus 652 pounds in fields that did not receive late treatment

Hunting spider populations were greater in both counties in 1978 than in 1977 but were similar in the two counties until mid-August when populations were somewhat greater in Pontotoc County for the remainder of the season. Heliothis spp. larval populations in squares, blooms and bolls increased in August in Panola County when populations of hunting spiders and other important beneficial arthropods decreased. The drastic reduction in the hunting spider and other important beneficial arthropod populations did not occur and Heliothis spp. populations remained at much lower levels in Pontotoc County.

Populations of web building spiders were similar in the two counties with a drastic decrease occurring in August. A resurgence in populations occurred in September especially in Pontotoc County probably because of plant regrowth and renewal in fruiting.

In a comparison of arthropods collected with the D-vac and unit sampling techniques, the ratios (estimated number of arthropods per acre collected by D-vac divided by estimated numbers of arthropods per acre collected by unit area samples) for various categories were as follows: total arthropods, 0.59; selected arthropods, 0.62; beneficial arthropods, 0.75; and faunal diversity, 1.3.

Introduction

The Optimum Pest Management Trial (OPM) in Panola County, Mississippi, conducted concurrently with the Boll Weevil Eradication Trial in North Carolina - Virginia began in 1978. The objectives are to develop data which will make possible evaluations of the biological, economic, and environmental impacts of the two programs if they are used across the Cotton Belt. Evaluations of the appropriate aspects of the Trials are the responsibility of the Biological, Economic, and Environmental Evaluation Teams. Their data will be made available to the Overall Evaluation Team which will make the final judgment on the best approach to deal with the boll weevil, Anthonomus grandis problem. ARS, now AR of SEA, was given the lead responsibility for developing data for the Biological Evaluation Team and for conducting research to improve existing or to develop new techniques which might be used as population suppression components in the Trials. This is being done by a Research Team in each Trial area.

A prototype operation was conducted in 1977 in Panola and Pontotoc Counties to develop base line data, to evaluate and refine techniques and to develop procedures which would permit smooth expansion of the program when the OPM Trial got underway in 1978. Twenty and ten cotton fields were monitored for insect, spider mite and spider populations in Panola and Pontotoc Counties, respectively. The fields in Pontotoc County were monitored because they were to be used to compare a Current Insect Control (CIC) program with that of the closely supervised program used in the OPM Trial in Panola County.

Results were given in a Special Report, "Development of Base Line Data in Panola and Pontotoc Counties, Mississippi in 1977 for the Optimum Pest Management Trial", issued in June 1977 and in the following articles prepared for publication:

Smith, J. W., W. P. Scott and C. R. Parencia. 1978. Predator-Prey Ratios for Control of Heliothis Species on Cotton.

1978 Beltwide Cotton Res. Conf. Proc. pp. 111-113.

Scott, W. P., J. W. Smith and C. R. Parencia. 1979. Tarnished Plant Bug, Lygus lineolaris and Heliothis spp. Infestations in Selected Cotton Fields in Panola and Pontotoc Counties, Mississippi in 1977. Submitted to Southwestern Entomologist.

Lockley, T. C., J. W. Smith, W. P. Scott and C. R. Parencia. 1979. Population Fluctuations of Two Groups of Spiders From Selected Cotton Fields in Panola and Pontotoc Counties, Mississippi. Accepted for publication in Southwestern Entomologist.

Procedure

In Panola and Pontotoc Counties, sixty-four and thirty-two fields were monitored for insect, spider mite and spider populations with twenty and ten fields being monitored twice weekly, respectively. In Panola County a high percentage, 98.7%, of the cotton acreage was included in the OPM Trial. In Pontotoc County the fields monitored are used to compare a Current Insect Control (CIC) program with that of the OPM Trial in Panola County.

Dynamic Crop Information

Data were collected weekly beginning with the week of May 29 when plants were in the presquare stage of growth. Plants on fifty feet of row were examined in five locations in each field. The numbers of overwintering boll weevils, bollworms, (Heliothis zea), tobacco budworm, (H. virescens), eggs and larvae, tarnished plant bugs, (Lygus lineolaris), clouded plant bug, (Neurocolpus nubilus), cotton fleahopper, (Pseudatomoscelis seriatus), were recorded on a per acre basis. Thrips, (Franklinella spp.), populations were recorded in numbers per plant. Observations were made on cotton aphid, (Aphis gossypii), spider mites, (Tetranychus spp.), and whitefly, (Trialeurodes abutolonea) with infestations recorded as none, light, medium, or heavy.

Weather delayed planting of most cotton fields so that the majority of monitored fields were not squaring until the first week in July. At this time, the numbers of boll weevils and punctured squares, numbers of bollworm - tobacco budworm larvae and numbers of damaged squares, and bolls were determined by examining 200 squares and 200 bolls (50 at 4 locations), and numbers of white blooms with those damaged were determined on 125 feet (50 ft at 5 locations) in each field. The row feet required for the inspections were recorded and the populations and damage were computed on a per acre basis. Numbers of bollworm - tobacco budworm eggs and larvae, plant bugs and cotton fleahoppers were determined on a per acre basis by examining plant terminals on 25 feet of row at five locations per field. Information

on the numbers of plants, squares, white blooms, bolls (by size), and missing fruiting forms on a per acre basis were collected weekly. Plant height, rooting depth and main stem nodes were recorded. Petioles were collected weekly for nitrogen analysis. All data taken were coded on special computer forms and were processed by the Mississippi State University Computer Center.

Beneficial arthropod populations were sampled with a D-Vac machine. Nocturnal species were not sampled. A total of 40 row feet (4 samples of 10 row feet each) were sampled weekly in each field. Four 100 sweep samples with a 15 inch sweep net were taken in each field. All samples were placed in a freezer at the field operation base and were then brought to the laboratory at Stoneville where specimens were separated from trash by hand, identified and counted under magnification. Each identified species or group was coded on computer forms and the data were processed by the MSU Computer Center with special handling for data analyses accomplished at the Stoneville computer terminal.

Static Crop Information

A small percentage of the cotton acreage was planted during the last week in April, but because of excessive rainfall and cool weather most of the acreage was planted after the middle of May. Fair to good stands of cotton were obtained in all fields although dates of emergence varied. Approximately 32,500 and 2,500 acres were planted to cotton in Panola and Pontotoc Counties in 1978, respectively. Fifty-six of the 64 monitored fields in Panola County were planted on 38 inch rows, six fields on 40 inch rows and two fields on 36 inch rows. Forty fields consisted of less than 25 acres and twenty-four

ranged from 25 to 100 acres. Ten acre increments were monitored in the larger fields. Plant populations were in the 20,000 to 30,000 per acre range in 24 fields in the 40,000 to 50,000 range in 23 fields, in the 60,000 to 70,000 range in 12 fields, and in the 80,000 range in 5 fields.

In Pontotoc County, twenty-five fields were planted on 38 inch rows and 7 were planted on 40 inch rows. Twenty-eight fields consisted of less than 25 acres and four fields of a little more than 25 acres. Plant populations were in the 30,000 to 40,000 per acre range in 12 fields, in the 50,000 to 60,000 range in 11 fields, in the 70,000 range in 4 fields and 100,000 range in 5 fields.

Six cotton cultivars were included in the fields in Panola County. Forty-eight were planted to Stoneville 213, one to GP, three to DPL 55, four to DES-056, six to DPL-16, and two to DPL-61. The soil types were Collins (fields 1, 2, 6, 9, 20, 21, 22, 23, 28, 29, 30, 34, 36, 37, 44, 45, 46, 47, 56, 59, 61, 64), Grenada (fields 3, 14, 4, 17, 16, 5, 15, 35), Loring (fields 7, 8, 11, 13, 21, 18, 27, 32, 48, 60), Falaya (fields 10, 19, 13, 24, 33, 39, 41, 42, 50, 51, 53, 54, 58, 63), Calloway (fields 25, 52, 55, 57), Memphis (fields 26, 49, 62), Alligator silt loams (field 40), mixed alluvial (field 43) and Alligator clay (field 38).

Four cotton cultivars were included in the fields in Pontotoc County. Twenty were planted to Stoneville 213, three to DPL-55, six to DPL-61, and three to DPL-16. The soil types were Chewacta (fields 1, 18), Robinsonville (field 7), Commerce (field 3), Frizzel (fields 4, 10), Cascilla (fields 5, 30, 8), Atwood (fields 6, 17, 20), Falkner

(fields 9, 25, 23, 26), Arkabutla (fields 12, 15, 19, 29, 31), Adaton (fields 13, 22), Providence (fields 14, 13), Ora (field 2), Mayhew (field 24), Bude (field 27, 32), Falaya (field 28), silt loams and Arbo silty clam loam (fields 11, 21).

Table 1 lists in percentages makeup of the peripheral ecosystem of the monitored fields in Panola and Pontotoc Counties, Mississippi in 1978. The estimated percentages are based on aerial photographs of the 20 and 10 intensively monitored fields and the remainder on rough sketches of the fields.

Table 1. Makeup in percentages of the peripheral ecosystem of 96 fields
monitored in Panola and Pontotoc Counties, Miss., 1978.

Field No.	Woods	Soybeans	Cotton	Woods Margin	Pasture	Grasses or Hay	Corn	Brush
Panola County								
1	15	45	20	20				
2		25	50	25				
3		10	65	10	10			5
4		15	75					20
5	5		20	20				55
6	45	15					15	25
7		10	25		25		15	25
8		35		20	20			25
9	55			35		10		
10		55	35			10		
11	25		60			5		10
12	15	55		20	10			
13		75	15	5		5		
14	35		25		15			25
15	25				65			10
16		30	65					5
17		60	15		15	10		
18	10	30	15		35			10
19		30	65			5		
20	35	35	20					10
21	35		25	25				15
22		45	15	20				20
23			25	45				30
24	35	30		25				10
25	25		25	50				
26	15	65	10	10				
27	70	15	15					
28		75		10		15		
29	25	55						20
30	30			25	30			15
31	25	45			15			15
32		20 ^{1/}	30	20			20	10
33		10	65	25				
34	15	25	25	25				10
35	30	10	50					10
36	20		70		5	5		
37	15	25	25	25		10		
38		65	15			5		15
39			75			25		
40	15	65	15	5				

Table 1. Continued.

Field No.	Woods	Soybeans	Cotton	Woods Margin	Pasture	Grasses or Hay	Corn	Brush
41		85			15			
42		55		15		10		20
43	10	10	60	10				10
44			50		20	15		15
45		10	30		35			25
46	25	20		45				10
47			25	55		10		10
48	25	45	15	15				
49	15			25	55			5
50		30	40	15				15
51		65	15	15				5
52			15	65				20
53		35	35	5	20	5		
54		20	65	10				5
55	15	20			45			20
56		65		30				5
57		50		20	20			10
58		25	15		45	5		10
59		15	25	40	15			5
60			30	40		5	20 ^{2/}	5
61	10	20	40	20				10
62		45	25	25				5
63			100					
64	45		25	20	10			
Pontotoc County								
1	35	30		15	15			5
2	25	35		15	15			10
3	25	30	35					10
4		30	40	20				10
5		30	50			20		
6			25	45		30		
7	25	70						5
8		40		10	30	10		10
9	25	45		25		5		
10	20	30	15	10	20			5
11		35	35			15		15
12		30	40		20			10
13		35	35			10	15	5
14		30	40		10	20		
15		35		25	30	10		
17	55	25		15		5		
18	15		35	35	5	10		
19	35	45		15		5		

Table 1. Continued.

Field No.	Woods	Soybeans	Cotton	Woods Margin	Pasture	Grasses or Hay	Corn	Brush
20		45				25		30
21		30				10	30	30
22			75	25				
23	10	45		35		10		
24		75				10		15
25		20		70	10			
26	30	15	20		30			5
27		30	25	25	20			
28	25	45		20	10			
29		45	35	15				5
30	55	15		20	10			
31	15	15	50	20				
32		30			30	20	20	
33	20			25	20		35	

1/ Peas

2/ Grain sorghum

Insecticide Applications

In Panola County, an average of 0.4 of an application of insecticide was applied to the 64 monitored fields for thrips control. Materials used were dicotophos, dimethoate and toxaphene. An average of 1.9 applications were made per field for Heliothis spp. control with permethrin (Pounce and Ambush), fenvalerate, sulprofos, methomyl and EPN + methyl parathion being used. In Pontotoc County two fields out of 32 were treated with dicotophos for thrips control. Treatment for control of Heliothis spp. averaged 0.9 insecticide applications per field with permethrin (Ambush and Pounce), monocrotophos, EPN + methyl parathion, acephate, chlorpyrifos, methomyl and azinphosmethyl being used. Regular inseason applications of insecticide were terminated in both counties by September 1. Methyl parathion at 0.50 pounds per acre was applied four times for boll weevil diapause control between September 8 and October 31 to all acreages (96%) of participating growers in the OPM Trial in Panola County. Each application spanned a period of 7 to 10 days. Insecticides were applied by producers. Those applied for boll weevil diapause control were made under the direction of personnel of the Mississippi Cooperative Extension Service which is the operational agency for the OPM Trial.

Weather

Rain gauges were installed at each monitored field site and rainfall was recorded daily on work days. A weather station was maintained at Batesville where air temperature, relative humidity and solar radiation were recorded. Similar records for Pontotoc County

were obtained from the Pontotoc Ridges Flatwoods Branch Experiment Station. Rainfall in Panola County ranged from 6 to 10 inches in April and May with below average temperatures. In June, the rainfall ranged from 3.50 inches to 7.50 inches. July and August rainfall ranged from 0 to 6.3 inches and 0.2 to 7.9 inches, respectively, resulting in drought in some areas of the county. Pontotoc County rainfall during April and May ranged from 8.50 to 11.50 inches with cool temperatures. Rainfall in June ranged from 5.00 to 8.50 inches. July and August rainfall ranged from 0.22 inches to 3.6 inches and 0.3 inch to 2.9 inches respectively. Moisture was less favorable for cotton production than in most areas of Panola County. Excellent weather for harvest prevailed in both counties. Tables 2, 3, 4, 5 and 6 give the weather data for April, May, June, July and August for Panola County in 1978. Tables 7, 8, 9, 10, and 11 give the same information for Pontotoc County. Tables 12 and 13 give the rainfall for each field monitored in the two counties.

Table 2. Weather data for April. Panola County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	83	52		.41	628
2	82	53		.39	579
3	83	54		.30	535
4	84	61	.50	.31	258
5	78	59		.11	618
6	84	58		.39	576
7	84	58		.32	615
8	87	58		.28	510
9	87	60	.18	.24	423
10	81	65		.23	150
11	75	51	2.01	.22	431
12	65	46		.11	248
13	61	47		.07	666
14	71	45		.26	587
15	76	50		.20	672
16	83	55		.22	584
17	80	62		.25	399
18	81	65	.27	.17	648
19	79	55		.42	599
20	68	43		.25	699
21	65	44		.21	697
22	66	42		.28	697
23	81	55	1.17	.42	607
24	75	59	.01	.14	351
25	74	56	.09	.13	638
26	66	48		.25	724
27	70	47		.26	722
28	76	47		.25	697
29	80	60		.27	366
30	80	63	.24	.19	483
Total			4.47	7.55	
Average	77	54			547

Table 3. Weather data for May. Panola County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	84	59	2.61	.29	467
2	75	48	.09	.22	605
3	67	48	.29	.31	109
4	57	52	.46	.01	243
5	62	47	.04	.06	597
6	73	51	.06	.19	287
7	75	64	1.35	.19	165
8	74	66	1.55	OVR ^{1/}	444
9	78	61	.20	.18	750
10	80	59		.27	744
11	81	62		.26	460
12	82	64		.49	420
13	81	58		.21	760
14	75	57		.35	759
15	81	59		.31	697
16	81	54	1.73	.30	679
17	75	57		.30	254
18	75	60		.10	530
19	86	65	.20	.19	439
20	86	67		.19	629
21	92	69		.29	470
22	89	67	1.23	.33	499
23	87	70		.15	640
24	90	70		.27	568
25	91	67		.23	406
26	88	68		.25	591
27	92	68		.25	605
28	95	70		.31	321
29	88	68		.15	603
30	87	67	1.0	.24	681
31	88	67		.23	583
Total			10.81	7.12	
Average	81	62			516

^{1/} Rain caused water to overrun pan.

Table 4. Weather data for June. Panola County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	89	69		.27	447
2	87	59	1.67	OVR ^{1/}	370
3	77	67		.08	431
4	80	66		.17	726
5	83	66		.27	700
6	88	70		.25	420
7	88	70		.28	282
8	80	70	2.80	.04	520
9	86	63		.23	771
10	78	60		.26	767
11	84	65		.25	711
12	89	75		.36	482
13	91	68	.15	.24	750
14	88	63		.39	785
15	85	59		.36	767
16	90	68		.34	646
17	93	74		.40	669
18	94	73		.39	614
19	93	72	2.15	.33	433
20	88	71		.19	604
21	92	73		.28	462
22	90	70	.05	.18	438
23	90	70		.17	654
24	94	73		.31	662
25	95	77		.31	715
26	96	76	.53	.36	721
27	96	77		.41	622
28	97	76		.33	541
29	97	77		.24	550
30	99	76		.25	569
31					
Total			7.35	7.94	
Average	89	70			594

^{1/} Rain caused water to overrun pan.

Table 5. Weather data for July. Panola County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	98	73		.41	644
2	93	75		.29	659
3	95	77		.35	527
4	96	74		.23	730
5	97	77		.35	692
6	97	73	.15	.34	714
7	98	77		.30	621
8	98	73		.32	662
9	96	75		.27	670
10	95	78	.40	.33	700
11	96	74		.36	595
12	93	75		.28	624
13	94	77		.30	678
14	96	73		.36	475
15	95	71		.21	495
16	90	69		.21	738
17	91	69		.34	716
18	92	67		.26	703
19	95	70		.30	624
20	95	75		.27	683
21	94	70		.36	626
22	92	71		.34	671
23	92	72		.32	647
24	94	70		.33	615
25	93	73		.29	624
26	94	74		.28	683
27	97	71	3.00	.37	553
28	90	70		.22	705
29	93	73		.22	678
30	95	75		.34	699
31	97	77	.21	.39	485
Total			3.76	9.54	
Average	95	73			643

Table 6. Weather data for August. Panola County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	92	72		.22	623
2	94	70		.32	598
3	94	73		.27	673
4	97	71		.33	576
5	87	68		.24	580
6	86	69		.24	674
7	89	67		.29	617
8	88	70		.28	287
9	88	69	.25	.28	537
10	84	71		.20	358
11	85	72	.35	.03	637
12	93	71		.33	577
13	91	73		.25	383
14	88	70		.17	641
15	90	70		.26	551
16	88	73	.22	.22	655
17	92	75		.31	665
18	94	74		.30	652
19	93	73		.32	631
20	96	73		.27	632
21	94	71		.35	642
22	92	65		.29	651
23	94	64		.28	635
24	98	71		.24	594
25	97	72		.28	577
26	98	74		.24	525
27	96	72		.28	606
28	93	72		.32	275
29	85	63		.18	174
30	81	67		.09	260
31	77	63	1.00	.11	582
Total			1.82	7.79	
Average	91	70			551

Table 7. Weather data for April. Pontotoc County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	84	40		.30	611
2	82	53		.32	629
3	84	53		.28	609
4	82	54		.28	552
5	78	51		.14	355
6	85	60		.28	572
7	82	58	2.15	.20	524
8	87	57		.26	564
9	86	61		.20	511
10	84	62		.30	581
11	77	32	.88	.20	297
12	61	30		.13	399
13	63	43		.08	268
14	73	44		.24	686
15	77	47		.21	621
16	83	51		.23	657
17	81	55		.17	493
18	80	59		.23	482
19	77	53		.30	609
20	58	42		.15	346
21	62	38		.16	548
22	63	38		.19	708
23	73	50	.98	.27	687
24	77	54	1.02	.20	569
25	78	56		.15	424
26	66	46		.20	451
27	71	42		.25	711
28	75	43		.24	723
29	79	50		.25	725
30	77	58		.13	350
Total			5.03	6.54	
Average	76	49			542

Table 8. Weather data for May. Pontotoc County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	80	60	2.88	0	390
2	73	44	.02	.12	629
3	70	46	.09	.25	654
4	64	50	1.43	.12	130
5	59	48		.04	126
6	70	48		.12	484
7	82	55	2.80	0	508
8	71	65	1.08	.08	105
9	77	60	1.95	0	324
10	79	51		.28	740
11	79	52		.21	743
12	82	60	.50	.21	467
13	80	57	.48	.18	356
14	70	53		.30	600
15	75	46		.27	751
16	73	47		.21	685
17	71	48		.13	459
18	78	52		.21	675
19	80	62	.14	.09	327
20	85	64		.17	504
21	90	65	1.89	.38	646
22	89	68	.60	.25	563
23	87	66	.36	.26	539
24	87	67		.23	619
25	90	67		.25	681
26	90	67		.29	662
27	93	68		.26	703
28	93	69		.28	623
29	90	66	.40	.28	539
30	85	65	.96	.23	523
31	86	64		.21	621
Total			15.58	5.91	
Average	79.9	58.1			528

Table 9. Weather data for June. Pontotoc County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	89	64		.25	702
2	90	65	.42	.30	695
3	78	63		.09	278
4	81	61		.16	489
5	85	62		.25	682
6	86	65		.22	623
7	88	66	2.08	.26	407
8	76	67	1.99	.18	174
9	86	63	.06	.22	608
10	77	56	.27	.27	697
11	83	61		.24	707
12	90	70	.07	.24	658
13	89	63	.43	.26	522
14	84	59		.30	758
15	82	56		.17	775
16	88	61		.34	713
17	88	71		.20	659
18	90	70		.42	711
19	91	66	2.01	.38	629
20	86	68		.19	576
21	89	71		.15	531
22	87	68	.04	.18	412
23	92	67		.21	565
24	93	69		.25	613
25	94	71		.21	622
26	95	74		.28	585
27	95	74		.28	648
28	93	73		.16	452
29	97	74		.25	677
30	97	73		.24	603
Total			7.37	7.15	
Average	87.9	68.5			592

Table 10. Weather data for July. Pontotoc County, 1978.

Date	<u>Air temperature</u>		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	98	74		.28	653
2	94	72		.28	560
3	94	75		.27	580
4	95	71		.25	598
5	98	69		.24	572
6	92	68		.25	694
7	94	68		.23	616
8	92	70		.19	471
9	95	73		.28	669
10	97	73		.28	524
11	95	71		.25	558
12	88	68		.14	424
13	93	70		.28	718
14	95	69	1.19	.38	456
15	91	69		.48	512
16	89	67		.22	602
17	88	67		.28	703
18	91	65		.29	735
19	94	67		.28	728
20	96	71		.25	582
21	95	70		.27	609
22	93	70		.31	688
23	93	70		.28	685
24	95	69		.35	713
25	93	70		.26	600
26	90	70	.05	.12	562
27	94	68		.23	666
28	92	66		.17	701
29	92	66		.20	581
30	96	69		.30	485
31	98	72		.35	459
Total			1.24	8.24	
Average	93.5	69.5			603

Table 11. Weather data for August. Pontotoc County, 1978.

Date	Air temperature		Rain (inches)	Evaporation	Solar Radiation
	Maximum	Minimum			
1	91	69		.11	550
2	96	70		.24	700
3	95	70		.25	784
4	98	70		.30	276
5	85	65	.32	.25	351
6	87	65		.21	547
7	87	65		.18	446
8	89	65		.22	542
9	77	70	.18	.03	146
10	84	70		.19	435
11	88	70		.14	380
12	88	70		.17	453
13	91	70		.20	399
14	90	67	.23	.28	169
15	89	68		.23	612
16	90	70		.29	607
17	96	72		.29	623
18	96	72		.25	556
19	96	73		.28	631
20	99	72		.25	639
21	95	64		.33	598
22	95	64		.29	678
23	97	65		.29	666
24	97	68		.28	638
25	99	71		.26	600
26	98	72		.25	556
27	98	71		.25	516
28	95	70		.33	600
29	91	70		.20	453
30	83	71	.29	.10	169
31	81	67		.16	380
Total			1.03	7.10	
Average	91.6	68.9			506

Table 12. Weekly rain (inches) from mid-May through September in 64 monitored fields, Panola County, 1978.

Field no.	May				June				July				August				September				Total
	15-21	22-28	29-4	5-11	12-18	19-25	26-2	3-9	10-16	17-23	24-30	31-6	7-13	14-20	21-27	28-3	4-10	11-17	18-24	25-30	
1	1.52	.20	1.26	2.43	.01	.47	.10		3.06		.38	2.17		1.55		1.15		2.60		16.90	
2	1.49	.18	1.22	3.72		.45	.47	.80	.55		2.12	.10	.58	1.24		1.85		1.50		16.27	
3	1.74	.19	1.20	2.90		.33	.43	.16	.50	.78	1.50	.10	.41	.85		1.74		2.28		15.11	
4	1.37	.15	.88	3.94	.02	.70	.10	.16	.33	.25	3.00	.10	.77	.60	1.00	2.07		.60		16.04	
5	1.95	.40	1.35	1.60	1.35			.23	.87			1.10		2.53		1.25		.75	1.40	14.78	
6	1.71	.42	1.60	1.00	.05	2.44		.23	1.00		.48	.30	.16	1.85		.90		1.86		14.00	
7	2.02	.43	1.23	1.75	.04	2.01		.20	.85		.36	.26	1.32	.61		.85		.79		12.72	
8	1.82	.46	2.16	1.42	.06	3.42		.46	.77	.05		.85		1.12		1.50		.71		14.80	
9	1.97	.40	1.82	.28	.07	5.35	.06	.18	.76	.08		.85		1.83	2.43	2.75		1.12		19.95	
10	2.03	.42	1.61	.89	.15	3.08	.22	.18	.65					2.09	1.25	2.50		1.66		16.55	
11	2.05	.46	2.10	1.02	.03	4.67	.02					.03		1.48	.05	1.21		1.67		14.79	
12	2.06	.50	1.16	1.46	.03	1.34			.37			.50	.20	2.35		1.59		.87		10.08	
13	1.55	.50	1.25	1.59		1.15	.01	.42	.45		1.50	.17		2.35		1.50		.50		12.94	
14	2.04	.38	1.23	3.29	.05	.65	.17		.37		.09	3.20		1.65		1.73		.66	.67	16.18	
15	2.02	.38	1.23	1.94		.40	.33		.50		2.92	.13		.40		1.10		1.80	1.28	14.43	
16	2.03	.16	.90	3.20	.05	.50	.10	.32	.05	.08	3.30	.84	.59	.54		4.03		.50		17.19	
17	1.85	.48	2.45	1.03	.08	3.16					.40	.25		.85		1.00		.92		12.47	
18	1.86	.50	2.14	.85	.10	5.70		.23	.27		1.50	.74	.37	.29		1.32		1.67		17.54	
19	1.91	.45	2.10	.72	.11	2.95			.71			1.08	.12	.22		3.00		1.77		15.14	
20	1.83	.50	3.10	.85	.02	2.80	.10					.60	.32	1.28		1.55		.75		13.70	
21	2.04	.80	2.10	.98		1.40					.50		.22	.81		1.72		1.11		11.68	
22	2.02	.80	2.45	1.78		1.84					.86		.23	.50		1.50		1.00		12.98	
23	2.01	.42	1.93	2.67		1.26						1.12	.43	.45		1.26		.95		12.50	
24	1.92	.46	1.82	2.43		1.40	.05				.24	1.10	.75	.37		1.28		1.30		13.12	
25	2.03	.50	.89	3.17	.02	.55		.12	.28	.27	2.96	2.34	.81	.40		2.10		.75	1.74	18.93	
26	1.86	.15	.03	1.55	.08	1.56	.32				3.12	.09	.05	.50			1.00	.20		10.51	
27	1.77	.36	1.41	2.24		.60	1.05		.04		1.65	.31	1.48	.35		1.50		.88	1.24	14.88	
28	1.96	.43	3.00	.61	.05	3.20					1.25	.15	.15	.31	.08	2.50		1.43		14.97	
29	1.95	.50	2.25	2.06		2.60	.24		1.06		1.39	.53	.53	.25		1.07	1.35	1.40		16.65	
30	1.63	.50	1.60	3.02		1.74	.30		.40		1.00	.42	.23	.25	.14	1.04		.68		12.95	
31	1.86	.15	.94	3.35		1.30							.77	.30		1.23	1.00	.20		11.10	
32	2.11	.30	1.01	3.10	.05	1.35		.09			1.86	.89		.76	1.12			.85		13.49	
33	1.65	.32	.76	3.44		1.00	.50		.09		1.82		.25	.27		.07				11.02	

Table . . Continued.

Field no.	May				June				July				August				September				Total
	15-21	22-28	29-4	5-11	12-18	19-25	26-2	3-9	10-16	17-23	24-30	31-6	7-13	14-20	21-27	28-3	4-10	11-17	18-24	25-30	
34	2.10	.30	.51	3.03		.78	1.04	.04			1.20	1.26	.15		1.12	1.50		1.00			14.03
35	1.73	.12	1.05	2.71	.05	1.00	1.03				3.23	.10		1.78		1.18		.80			14.78
36	1.27	.23	2.14	.86		1.27	1.00	.37			3.22							1.15			11.51
37	1.67	.21	2.16	.60		1.81	.25		.19	.02	.65	1.15	.25	.58		1.13		1.41			12.08
38	1.77	.34	2.48	1.56		2.37		.37	1.98		.12	1.76		1.00	.50	1.38		1.25			16.88
39	1.64	.50	3.20	.75		3.35	5.00		1.23						1.00			1.42			18.09
40	1.64	.50	2.60	.50		4.09			1.42	.04		1.89	.85	.67	.26	2.37		1.25			18.08
41	1.77	.34	2.63	3.44		2.85	.31		.02		1.98	.50	1.65	.20		1.22		1.00			17.91
42	1.92	.22	1.86	1.66		1.35	.75				.39	1.22		1.50		1.60		1.60			14.07
43	1.10	.30	.57	3.05	.05	.75	.50		.60		1.01		1.00	.57		1.20		.96			11.66
44	2.02	.14	1.05	3.58		1.38	1.15				.26		1.62	.20		.25		1.10			12.75
45	1.66	.20	.98	3.29	.01	1.05	.85		.36		5.95		1.80	.17		1.52		1.44			19.28
46	1.86	.21	.86	3.37		1.50	1.20		.50		3.90	.20		1.00		1.90		1.44			17.94
47	2.03	.40	.95	2.10		1.30	1.05				4.85		.85	1.20		1.41		1.85			17.99
48	2.02	.29	.94	3.03	.16	1.29	.50		.08		4.50		1.25		1.85		1.1	1.16	.24		18.17
49	1.78	.26	1.00	3.50		1.85	.75	.21				3.25	2.00	.72		.87		.47			16.90
50	1.93	.23	2.67	2.80	.15	2.20	.53	.15	.40		3.00	.21	.60	.22		1.00		.94			17.03
51	1.93	.24		3.48	.23	1.77	.74	.18	.32		.65	1.25	2.44	.10		2.03		.65			16.01
52	1.83	.23	2.10	3.20	.01	3.24	.54				1.15	2.50	.28	1.14	.75	1.20		.50			19.87
53	1.87	.40	1.11	2.18	.03	3.45	.85	.24	1.20			3.05	.50	1.30				.50			16.05
54	1.76	.63	2.72	3.10		2.90	.25		.65	.10	2.15		2.24	.21		1.12		.52	1.25		19.60
55	1.83	.24	.96	1.12		1.54	.35				2.35		1.79	.92	.30	1.00		.75			13.15
56	1.74	.32	.87	3.20	.35	1.77	.50		.65		1.72	.30	1.66	.58		1.75		.83			16.24
57	1.94	.35	1.00	3.82		1.80			.52		2.10	.07		3.12		1.00		1.20			16.92
58	1.98	.40	.85	3.20		1.86	.07					3.50		.67	.65	2.10		.84			16.12
59	2.03	.16	1.03	2.50		1.60						.50	3.20	.55		.95		.95			14.47
60	1.63	.23	.81	2.47		1.60	.06	.65	1.00		2.05	2.74	2.04			.95		.53			16.37
61	1.28	1.20	1.27	3.35		1.05			.50			.48	1.75	.60				.90			12.38
62	1.89	.22	.94	2.18	.02	1.12	.12		.32		1.12	.50	1.75	1.70		.94		.68			13.50
63	1.47	1.50	2.64	2.65		2.21	.23		1.30		1.17	.29	1.50	2.50		1.00		.83			19.29
64	1.76	.32	1.23	2.19	.02	1.37	.13	.15	.65		1.15	.27	1.50	1.67		.90		.52			13.83

Table 13. Weekly rain (inches) from mid-May through September in 32 monitored fields, Pontotoc County, 1978.

Field no.	May				June				July				August				September				Total
	15-21	22-28	29-4	5-11	12-18	19-25	26-2	3-9	10-16	17-23	24-30	31-6	7-13	14-20	21-27	28-3	4-10	11-17	18-24	25-30	
1	1.26	.13	1.50	3.82		1.87	.11	.10	.31	.02	.40		.31	.43	.10	.57		.98	.04	.10	12.05
2	1.26	.11	1.44	4.75	.02	3.36		.25	.40	.06	.63		.50	.35	.25	.55		1.14	.08	.10	15.25
3	1.21	.12	1.44	4.60	.05	3.63		.23	.72	.06	1.14	.02	.65	.25	.03	.43		.84	.09		15.51
4	1.21	.10	1.72	5.00	.05	3.09		.23	.79	.04	.60	.01	.12			.17		.85			13.98
5	1.21	.09	1.35	4.79		3.10		.30	.11	.07	2.47	.02	.50	.33		.52		.84	.26	.26	15.96
6	1.21	.09	1.51	5.91		2.64		.20	.14	.12	2.67		.55	.37		.52		.71			16.90
7	1.19	.09	1.43	5.62		2.44		.15	.68	.07	.58	.07	.21	.43		.46		.16			13.58
8	1.27	.10	1.41	5.71		1.40		.14	.29	.03	3.00	.02	.74	.65		.32		.56	.30	.11	15.94
9	1.53	.17	1.11	6.11		.41		.07	.02	.15	1.32		.75	.15			.23	.85			12.68
10	1.14	.22	.96	5.97		2.25		.28	.78	.23	1.05		.35	.62	.12	1.28		.83	.34		15.04
11	1.21	.11	1.39	6.20		2.63		.12	.11	.31	.62		.18	.60	.97	.48		.16			15.20
12	1.01	.15	1.38	6.30		1.70		.12	.01	.38	.65	.05	.32	.35	.97	.54		1.07	.09	.12	15.03
13	1.55	.19	1.06	6.40		1.39		.17	.47	.50	2.15	.04	.30	.29	1.58			1.11	.30		18.16
14	1.55	.19	1.07	6.50		1.15		.22	.83	.72	1.78	.04	.14	.25	.46	.23		.95	.14	.61	16.83
15	1.52	.17	1.10	6.20		.40			.46	.08	1.01		.65	.88	.23	.11		.90			13.71
16	Poor stand - another field selected																				
17	1.44	2.49	1.38	4.00	.14	2.50		.03	.17		.02	.07	.20	.42		.29	.70	1.71	.44		16.00
18	1.44	2.48	1.39	3.63	.55	1.75		.35	.71		.05	.08	.20	.32		.22	.61	1.62	.36		15.76
19	1.35	.72	1.36	4.08	.50	2.14		.07	.73		.05	.01	.46	.30			.48	1.66	.43		14.34
20	1.25	.72	1.21	4.40	.10	2.00		.34	.12		.04		.50	.28		.48	.12	1.75			13.19
21	1.34	.72	1.36	4.50	.70	1.74		.05	.84		.02	.01	.73	.37	.58	.81	.03	2.06	.42		15.08
22	1.36	.74	1.44	5.42	.08	.50	.11	.20	.37		.33	.02	.33	.78	.15	.25	.02	1.76	.59		14.77
23	1.35	1.22	1.30	4.72	.07	.50	.18		.30		.36	.06	.41	.34	.05		.02	1.40	.29		13.56
24	1.34	1.42	1.29	4.30	.01	.50	.40	.25		.04	.20	.15	.14				.02	1.74	.83		11.80
25	1.36	.23	1.14	4.07	.30	.55	.18	.31	.05	.05	.06	.03	.52	.50		1.20	.03	1.74	.83		13.15
26	.85	.92	1.38	4.75	.33	.50		.06	.15		.92		.23	.33		.85	.02	.99	.67		12.95
27	1.50	.64	1.41	5.01	.11	.62		.10	.10		.98	.05	.30	.50		.42	.05	1.24			13.03
28	1.49	.54	1.55	4.85	.14	.55		.22	.07	.03	.98		.57	.50		.43	.01	1.15			13.08
29	1.38	.62	1.45	4.04		.65		.12		.15	.65	.06	.37	.72		1.20	.06	1.44	.65		13.56
30	1.27	.39	1.48	5.00	.09	.66		.25			1.26	.02	.83	.72		.39		.92			13.28
31	1.27	.44	1.41	5.46	.03	.61		.37	.05		.47	.05	.91	1.18		.44		.60			13.29
32	1.37	.34	1.43	5.44		.41			1.10	.02	.22	.01	.34	1.63		.91		.63			13.85
33	1.38	.34	1.43	6.35		.35			.88		.49	.02	.43	.82	.02	.39		.42	.02		13.34

Yield Information

The good weather resulted in some fields being harvested as early as September 20. Harvest was completed in early December. Yield records were taken from all fields monitored in Panola and Pontotoc Counties during 1978. Ten-10 foot areas were hand picked in each field. Seed cotton was brought into the laboratory and weighed and later returned to the farmer. Green bolls were counted in each picked section. In Panola and Pontotoc Counties, the average yield was 1.3 and 1.1 bales per acre, respectively. Yields of lint per acre in various fields were as follows:

Field No.	Pounds of lint	Field No.	Pounds of lint
Panola County, 1978			
1	600	28	629
2	785	29	427
3	528	30	633
4	571	31	688
5	418	32	445
6	564	33	686
7	614	34	677
8	PBQ ¹ /	35	512
9	718	36	757
10	674	37	503
11	316	38	PBQ ¹ /
12	596	39	877
13	529	40	762
14	PBQ ¹ /	41	PBQ ¹ /
15	578	42	726
16	450	43	621
17	562	44	539
18	485	45	741
19	583	46	718
20	896	47	PBQ ¹ /
21	769	48	PBQ ¹ /
22	472	49	PBQ ¹ /
23	561	50	652
24	450	51	726
25	539	52	PBQ ¹ /
26	436	53	641
27	643	54	820

Field No.	Pounds of lint	Field No.	Pounds of lint
55	PBO ^{1/}		
56	PBO ^{1/}		
57	495		
58	703		
59	771		
60	703		
61	688		
62	673		
63	972		
64	668		

Pontotoc County, 1978

1	409	18	409
2	407	19	579
3	703	20	369
4	321	21	579
5	PBO ^{1/}	22	451
6	PBO ^{1/}	23	454
7	776	24	PBO ^{1/}
8	488	25	PBO ^{1/}
9	490	26	551
10	607	27	668
11	703	28	706
12	528	29	PBO ^{1/}
13	450	30	703
14	502	31	668
15	596	32	496
17	267	33	361

^{1/} Field picked by owner before yield estimate could be made.

Insect, Spider Mite and Spider Populations

Thrips.--Most growers in both counties planted systemic insecticide treated cottonseed and less than one-third of all fields were treated with conventional insecticides for thrips control. In most cases, infestations were not severe enough to justify treatments, Figure 1.

Cotton aphid.--Some heavy infestations of a black aphid, probably the cowpea aphid, were observed in a few of the fields in June. Populations of the cotton aphid did not become a problem throughout the season, Figure 2.

Spider mites.--Spider mites did not become a problem in any field, Figure 3.

Bandedwinged whitefly.--Whiteflies increased in most fields by the end of the season but population buildup was too late to cause damage, Figure 4.

Cabbage looper.--Cabbage looper, (Trichoplusia ni), infestations were light throughout the season.

Cotton fleahopper.--Populations of this insect occurred in low numbers throughout the season, Figure 5.

Beet armyworm.--Beet armyworms, (Spodoptera exigua), were not a problem in either county.

Yellowstriped armyworm.--Heavy infestations of the yellow-striped armyworm, (Spodoptera ornithogalli), were observed in certain spots within a few fields when plants began to square. However, control measures were not used for this pest.

Fall armyworm.--Fall armyworms, (Spodoptera frugiperda), were picked up occasionally in some of the monitored fields but populations were not heavy enough to require control measures.

Leafhoppers.--Infestations of leafhoppers, primarily Empoasca fabae with other genera such as Graphocephala, Graminella, Chlorotettix, Erythroneura, and Oncometopia represented were generally light, Figure 6.

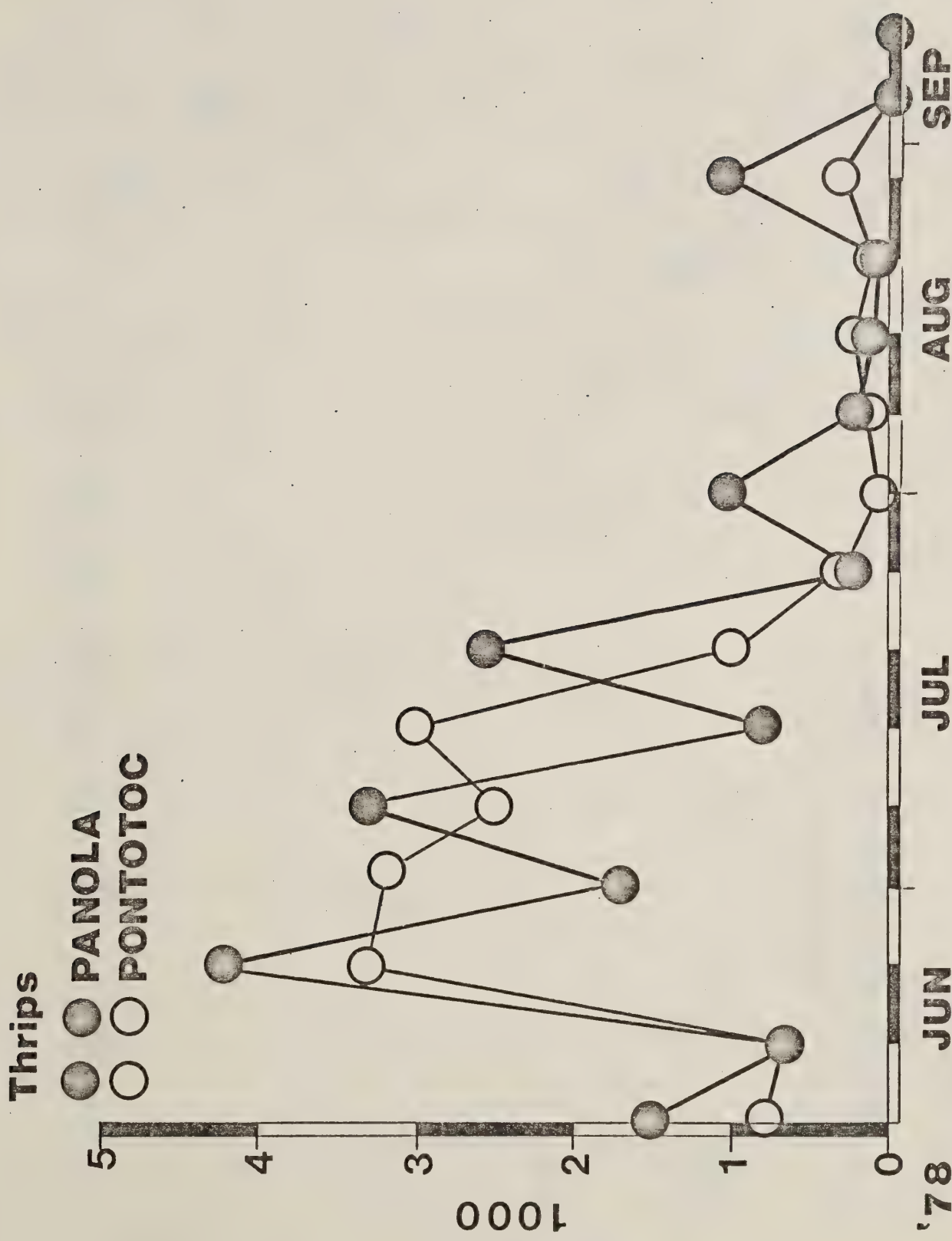


Fig. 1. - Thrips populations per acre based on D-vac samples in Panola and Pontotoc Counties, 1978

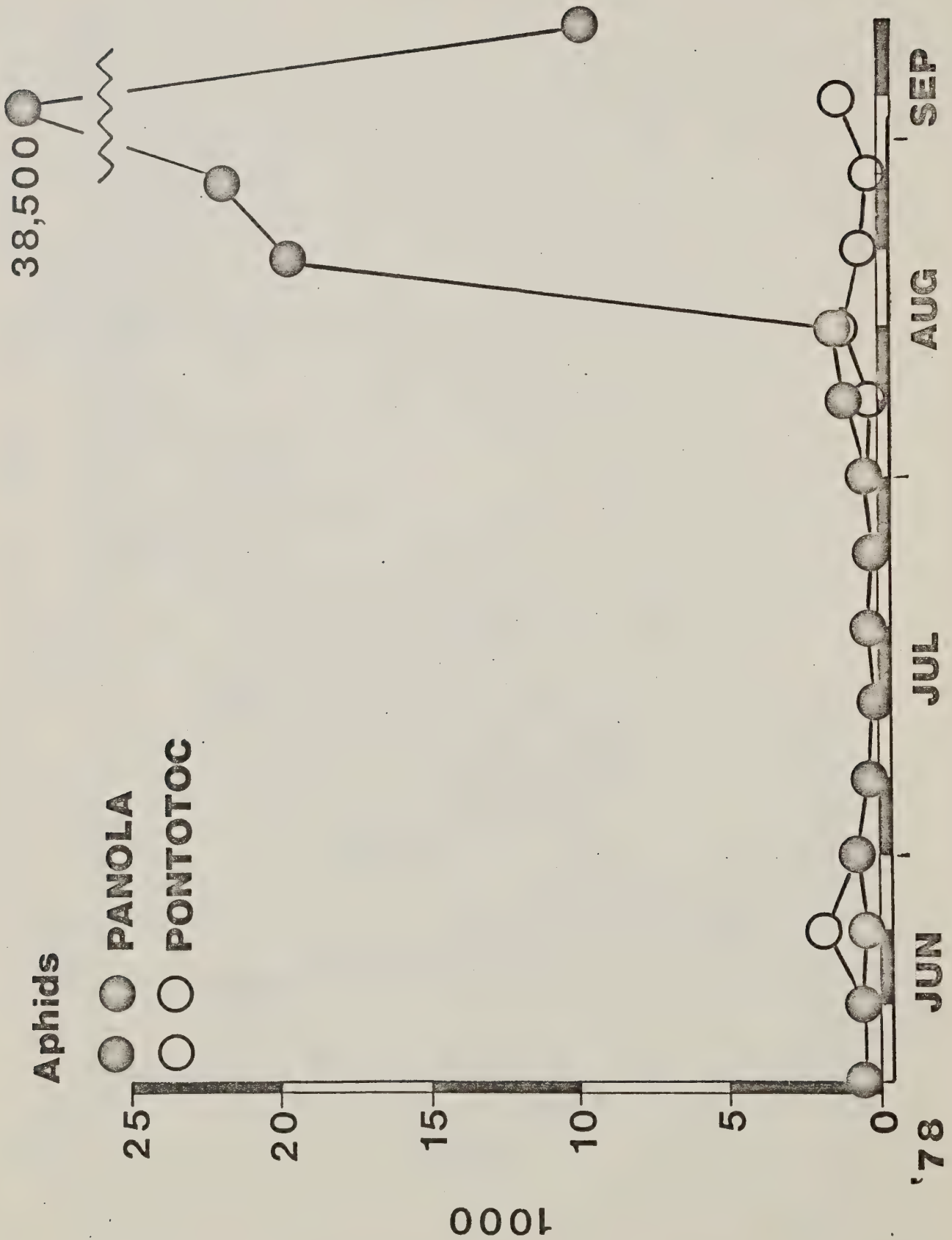


Fig. 2. - Cotton aphid populations per acre based on D-vac samples in Panola and Pontotoc Counties, 1978.

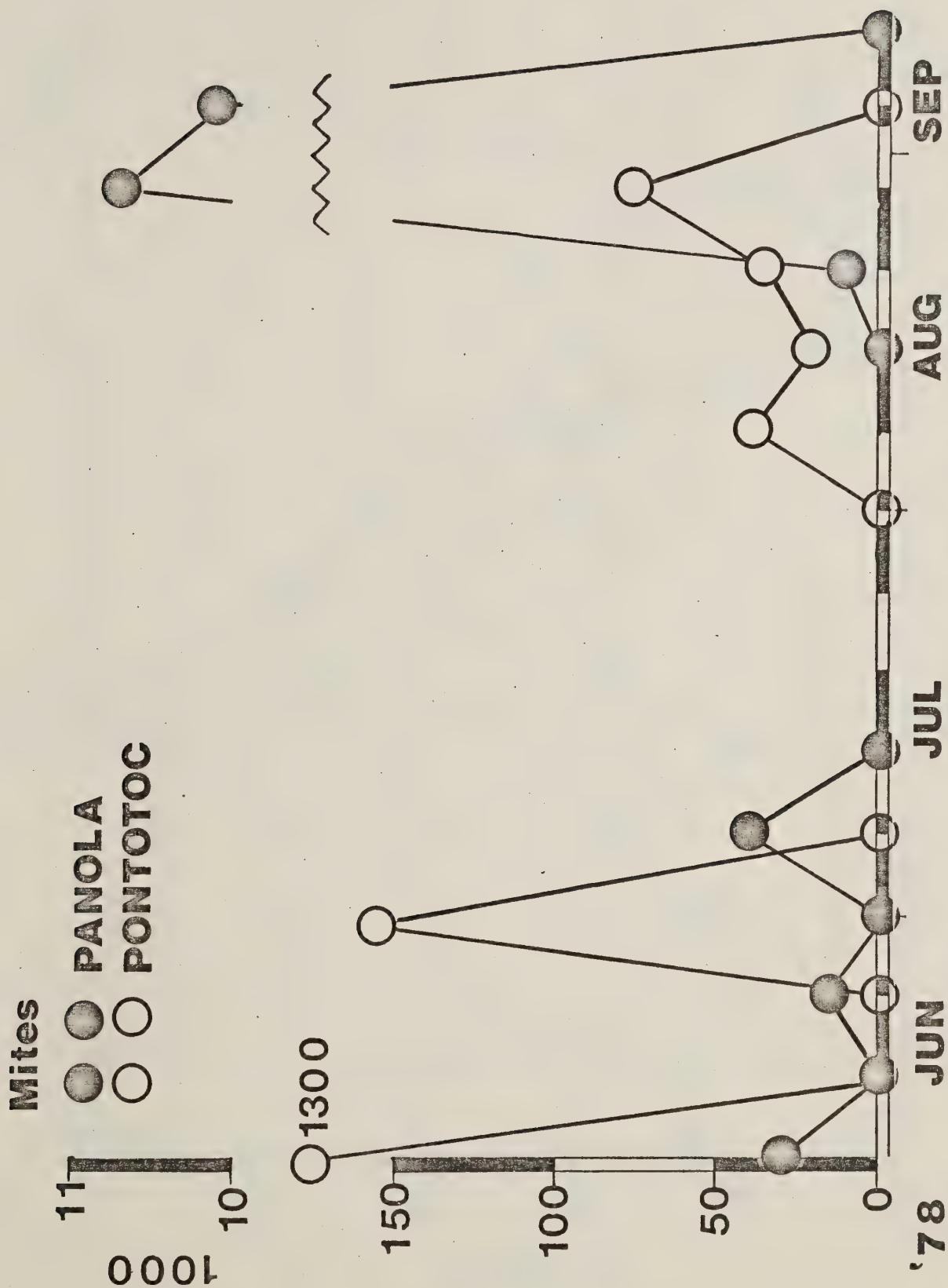


Fig. 3. - Spider mite populations per acre based on D-vac samples in Panola and Pontotoc Counties, 1978.

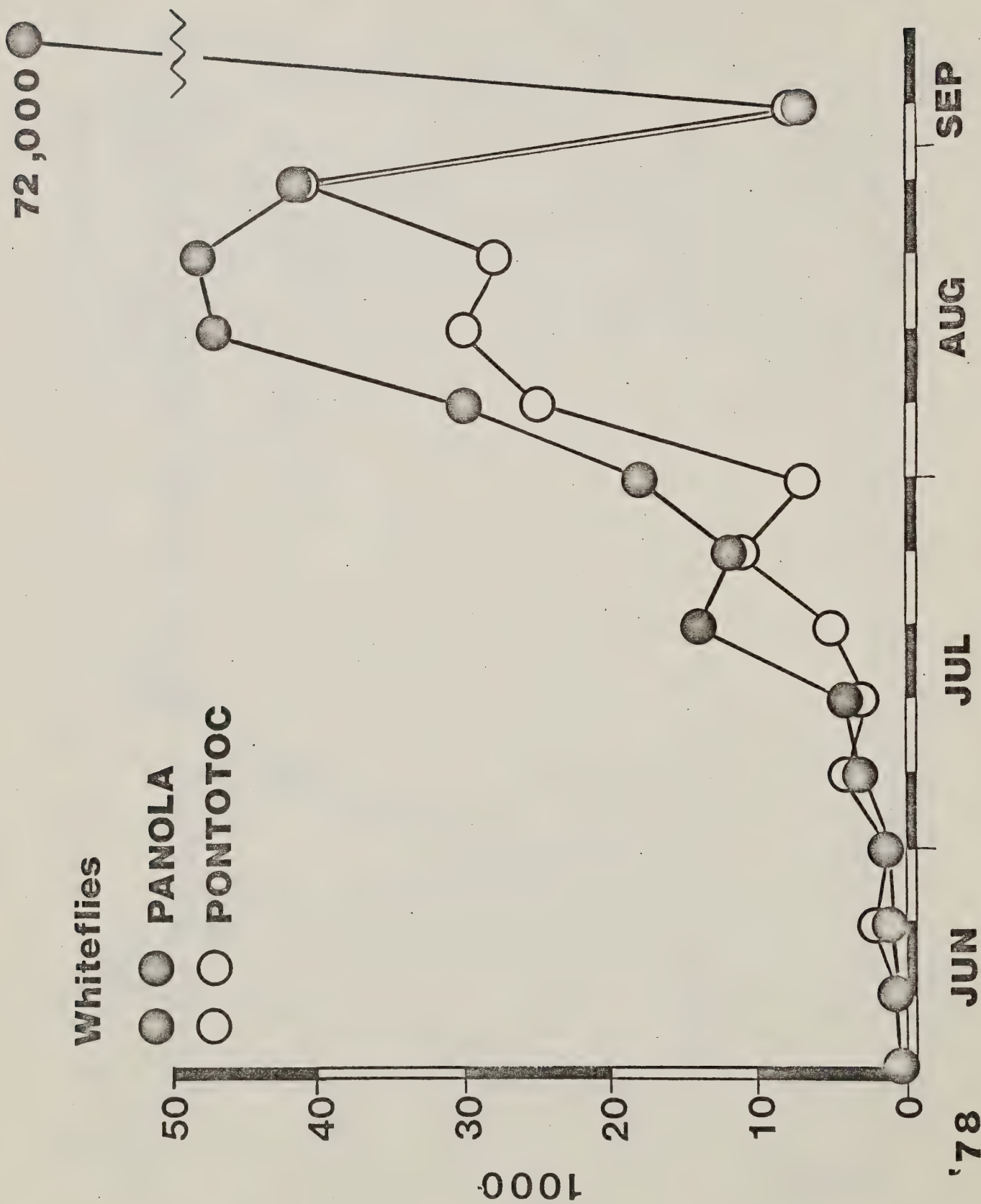


Fig. 4. - Whitefly populations per acre based on D-vac samples in Panola and Pontotoc Counties, 1978

P. seriatus

- PANOLA
- PONTOTOC

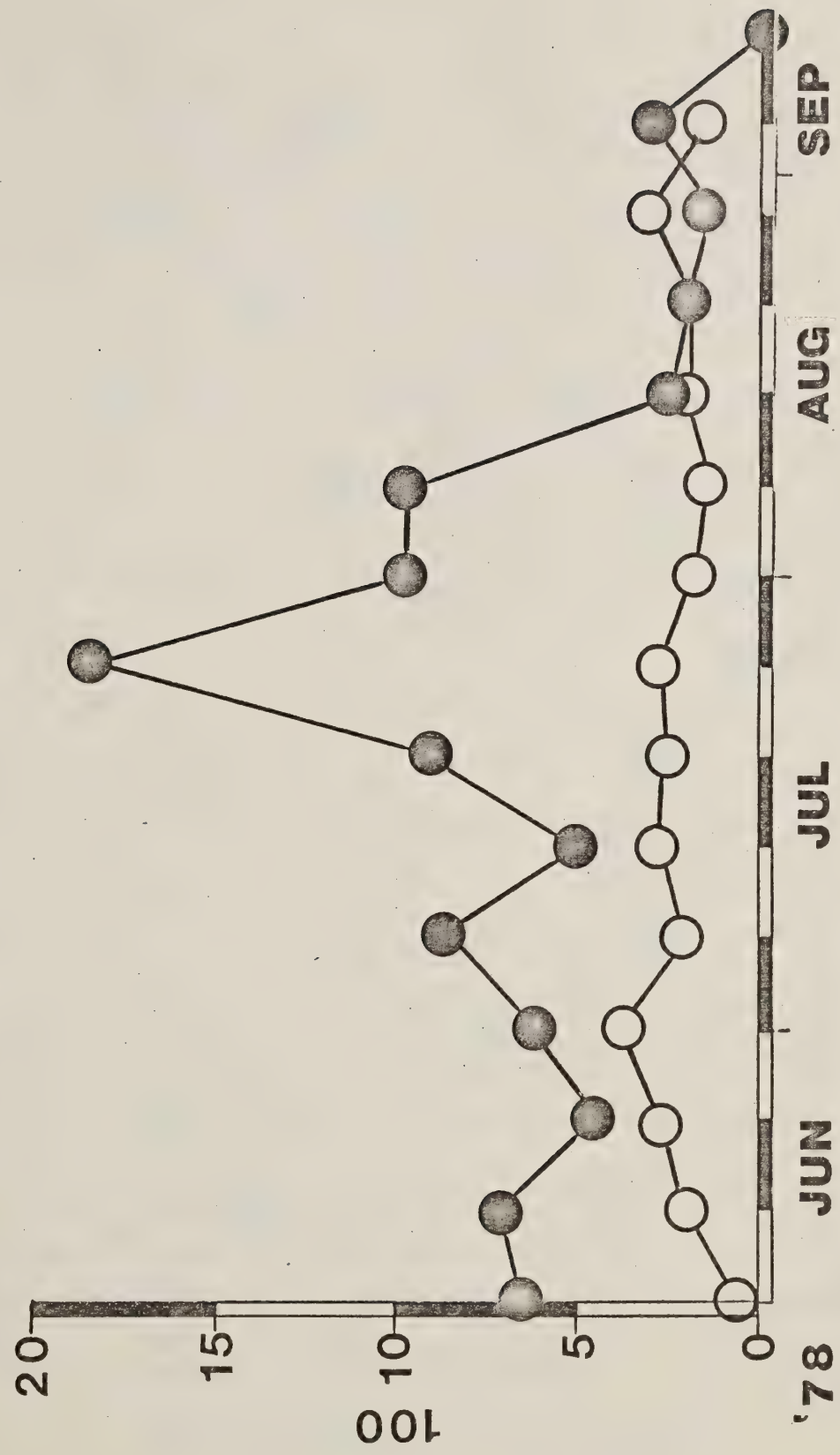


Fig 5. - Cotton fleahopper populations per acre based on D-vac samples in Panola and Pontotoc Counties, 1978.

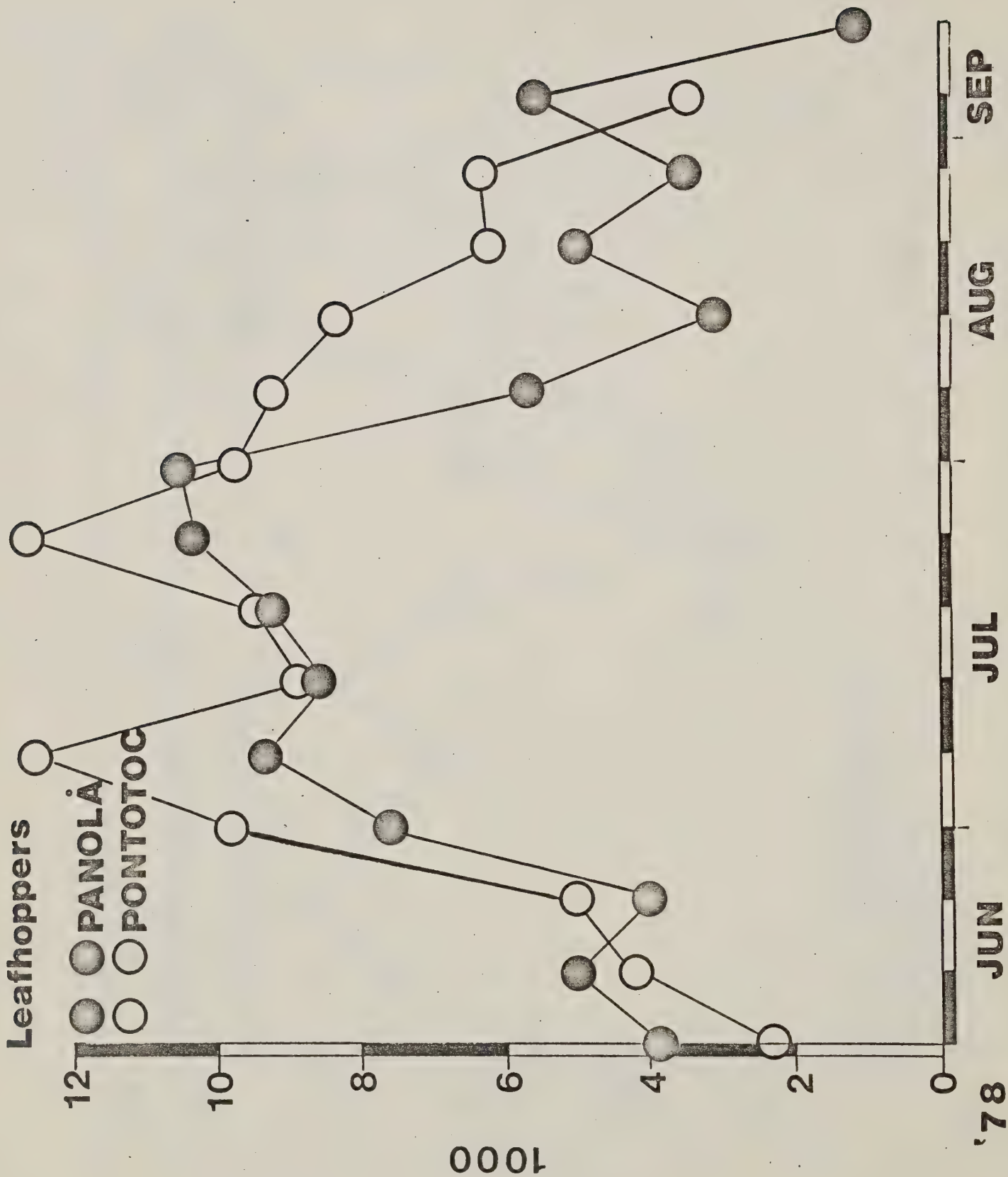


Fig. 6. - Leafhopper populations per acre based on D-vac samples in Panola and Pontotoc Counties, 1978.

Boll weevil.--Boll weevil survival was low because of extremely cold weather during the winter of 1977-78. Boll weevil populations in surface woods trash collected and inspected in December 1977 averaged 3874 and 3025 per acre in Panola and Pontotoc Counties, respectively. None were found in the same sites in March, 1978. In the spring in Panola and in the fall in Panola and Pontotoc Counties, 1 trap per 15 to 20 acres of cotton was installed near or around all of the cotton acreage in both counties. Traps were serviced and inspected weekly. Figure 7 shows the number of boll weevils captured per trap during the spring and early summer in Panola County. Extrapolation of trap catches based on trap efficiency indicated a population of 70,000 adults for 32,500 planted acres or only about two per acre. Because of the low survival, population buildup was slow and none of the monitored fields in either county required treatment for control of this pest before treatments for bollworm - tobacco budworm control began. Only 300 of the 32,500 acres in Panola County were treated for boll weevil control per se. Insecticidal treatments for bollworm - tobacco budworm control may have precluded treatment for boll weevils in a few instances. Insecticide treatments for bollworm - tobacco budworm treatments were terminated in all monitored fields by September 1.

Comparative boll weevil adults and punctured squares per acre for Panola and Pontotoc counties, respectively, are shown in Figures 8, 9, 10 and 11.

Figure 12 shows the number of boll weevils trapped in the fall in the two counties. The diapause control applications made during September and October were effective in reducing the boll weevil

population in Panola County. Weekly trap capture averages were considerably lower in Panola than in Pontotoc County. Above normal temperatures, regrowth and fruiting of cotton plants favorable for weevil development, and weevil movement from areas outside of the county were reflected in the increased trap catches after diapause treatments were completed on October 31. Stalks were being destroyed at this time in Panola County which tended to increase the number of weevils responding to traps in those areas.

Surface woods trash samples were collected and inspected in each county in December. Fall samples averaged 430 and 1532 boll weevils per acre in Panola and Pontotoc Counties, respectively, indicating a reduction in the number of boll weevils that entered hibernation sites in Panola County resulting from treatment for diapause control. The weevils were dissected by Dr. W. H. Cross. Most males and all females had enough fat for potential survival.

Plant bugs.--Tarnished plant bug infestations were light in both counties with no insecticides being applied for control. Populations of the clouded plant bug were greater in both counties than usual with increased numbers occurring in the latter part of the growing season. Populations of both species were somewhat higher in Pontotoc than in Panola County, Figures 13 and 14. Populations were lower in Panola County than in 1977 but were about the same in Pontotoc County. Refer to Special Report "Development of Base Line Data in Panola and Pontotoc Counties, Mississippi in 1977 for the Optimum Pest Management Trial."

A comparison of 3 methods of estimating plant bug populations is given in figures 15 and 16. In Panola County the average peak population

of about 850 per acre determined by D-Vac sampling occurred on July 26. The terminal inspection average peak was about 500 on August 1 and the sweep net average peak was about 300 per acre on July 5 though it were about 250 per acre on August 1. Thus population estimates determined by D-Vac samples was about 1.7 times that determined by terminal inspection and 2.8 times that determined by the sweep net method.

In Pontotoc County, the average peak populations of 2100 and 1500 occurred on July 5 and August 1 averaging 1800 per acre. The terminal bud inspection average peak was 450 per acre on July 12 while on the same date the average sweep net peak was 600 per acre. Populations determined by D-Vac samples were 3 times that determined by the sweep net method and 4 times that of the terminal bud inspection method.

Thus, there appears to be little difference in estimating populations with the sweep net or terminal bud inspection methods. The D-Vac method gave a significantly higher population estimate than either of the other methods.

Bollworm and Tobacco Budworm.---Heliothis spp. infestations were light to moderate in both counties. Averages of 1.9 and 0.9 insecticide applications were made in Panola and Pontotoc Counties, respectively, for their control. This compared with averages of 3.9 and 1.6 insecticide applications made in the two Counties in 1977 indicating a somewhat higher infestation in that year. Infestations were lighter in Pontotoc County in both years probably because of less favorable weather conditions. The nonuse of insecticides for lygus bug control in 1978 which preserved predator populations, may have helped reduce Heliothis spp. infestations.

Comparative Heliothis spp. egg and larval populations on terminal buds in the two Counties are shown in Figures 17 and 18. Average egg populations peaked at about 950 and 780 at the end of July in Pontotoc and Panola Counties, respectively. Larval populations in terminal buds were extremely low in Pontotoc County. Heliothis spp. larval populations per acre in blooms, squares, and bolls are shown in Fig 19. The peak total larval population in early August was about 4,000 per acre in Panola County and less than 2,000 per acre in Pontotoc County.

Figures 20 and 21 give Heliothis spp. larval populations in squares and damaged squares per acre in Panola and Pontotoc Counties, respectively. In Panola County, average larval populations peaked at about 2,500 per acre in early August and at about 9,000 damaged squares per acre in early July. In Pontotoc County, average larval populations in squares peaked at about 1400 per acre in late July and damaged squares at about 4500 per acre in mid-July.

Figures 22 and 23 give average Heliothis spp. larval populations in bolls and damaged bolls per acre in Panola and Pontotoc Counties, respectively. In Panola County, boll damage peaked after mid-August at slightly more than 3,000 per acre and larvae at about 800 per acre. In Pontotoc County boll damage was low until August 1 when it averaged about 4,000 per acre with a dramatic increase to 8,000 per acre in mid-August. We have no explanation for the apparent lack of correlation between larval populations in bolls and damaged bolls.

Seasonal, per acre production of squares, blooms and bolls in the Panola and Pontotoc Counties may be noted in Figures 24 and 25, respectively.

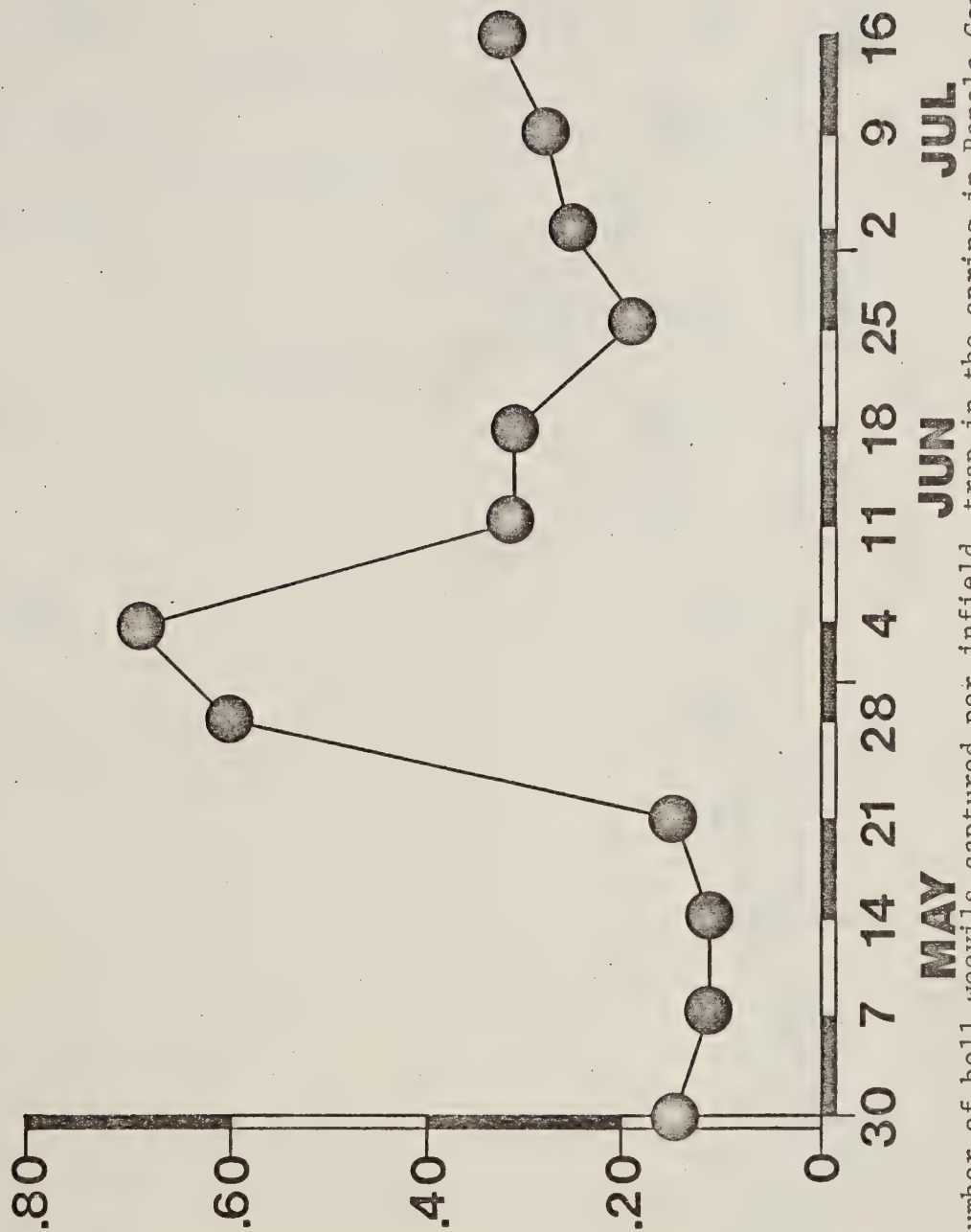


Fig. 7. - Ave. number of boll weevils captured per infield trap in the spring in Panola County, 1978

**BOLL WEEVILS
PANOLA**

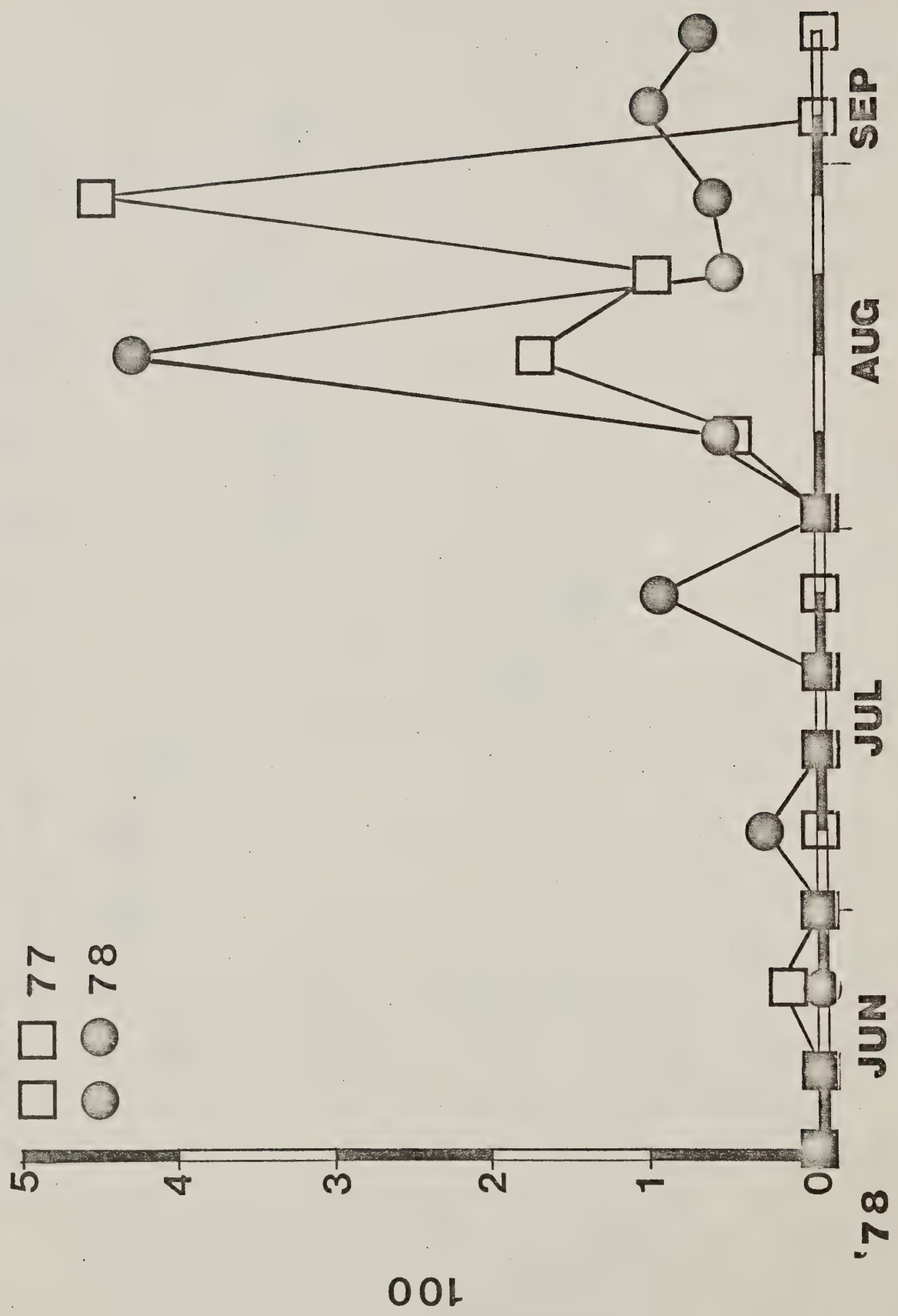


Fig. 8. - Adult boll weevils per acre in squares in Panola County in 1977 and 1978

**BOLL WEEVILS
PONTOTOC**

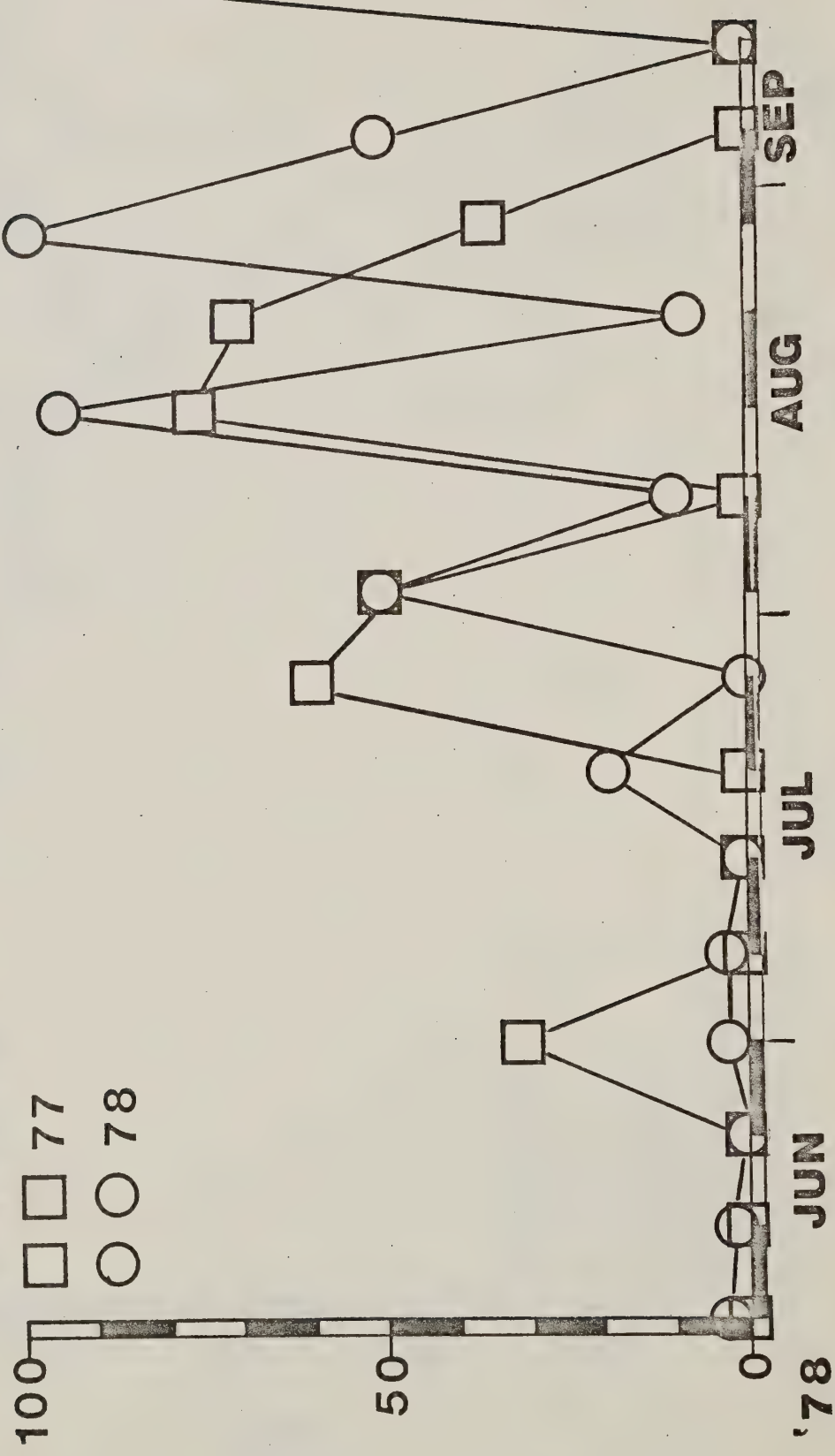


Fig. 10. - Adult boll weevils per acre in squares in Pontotoc County in 1977 and 1978

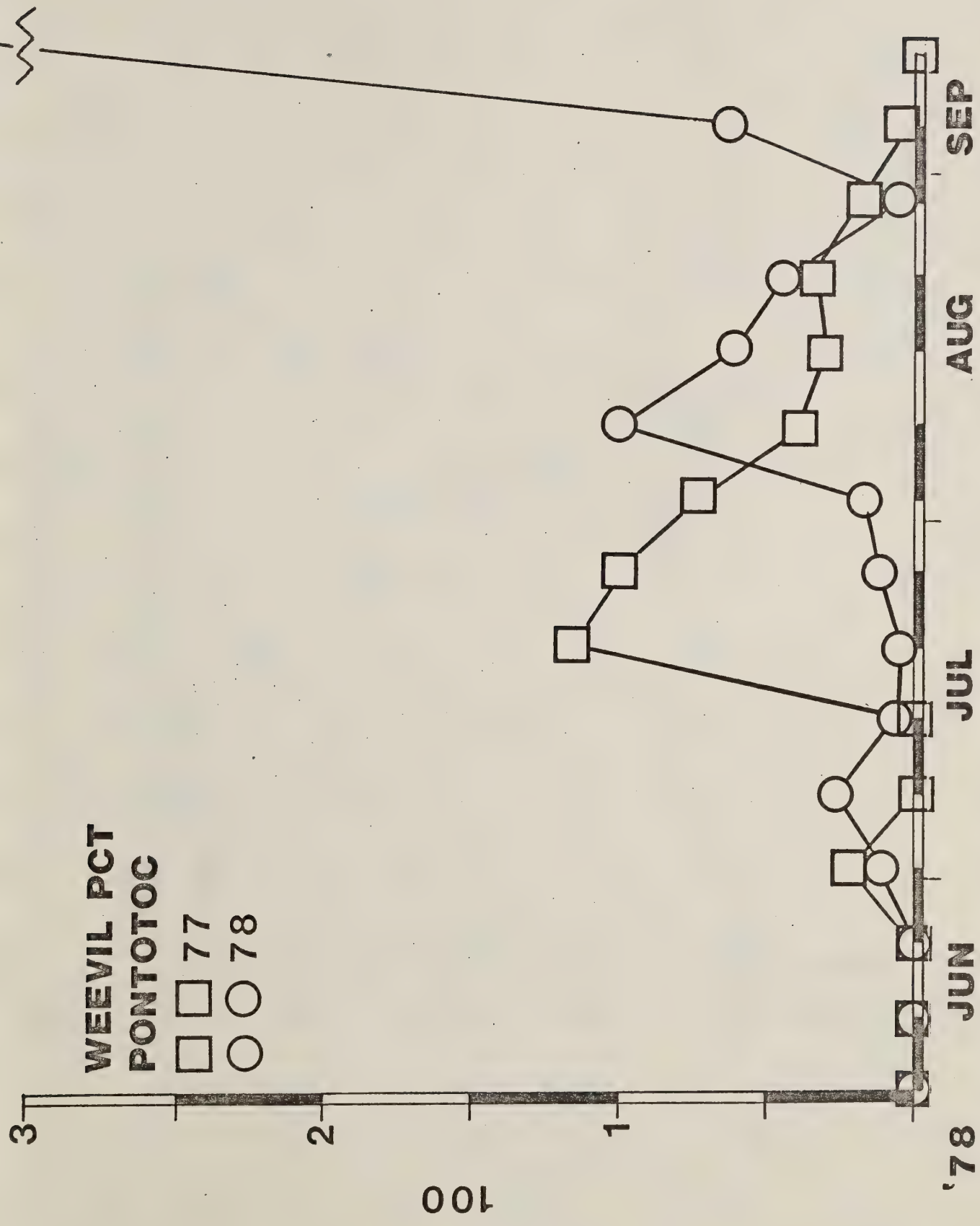


Fig. 11. - Boll weevil punctured squares per acre in Pontotoc County in 1977 and 1978

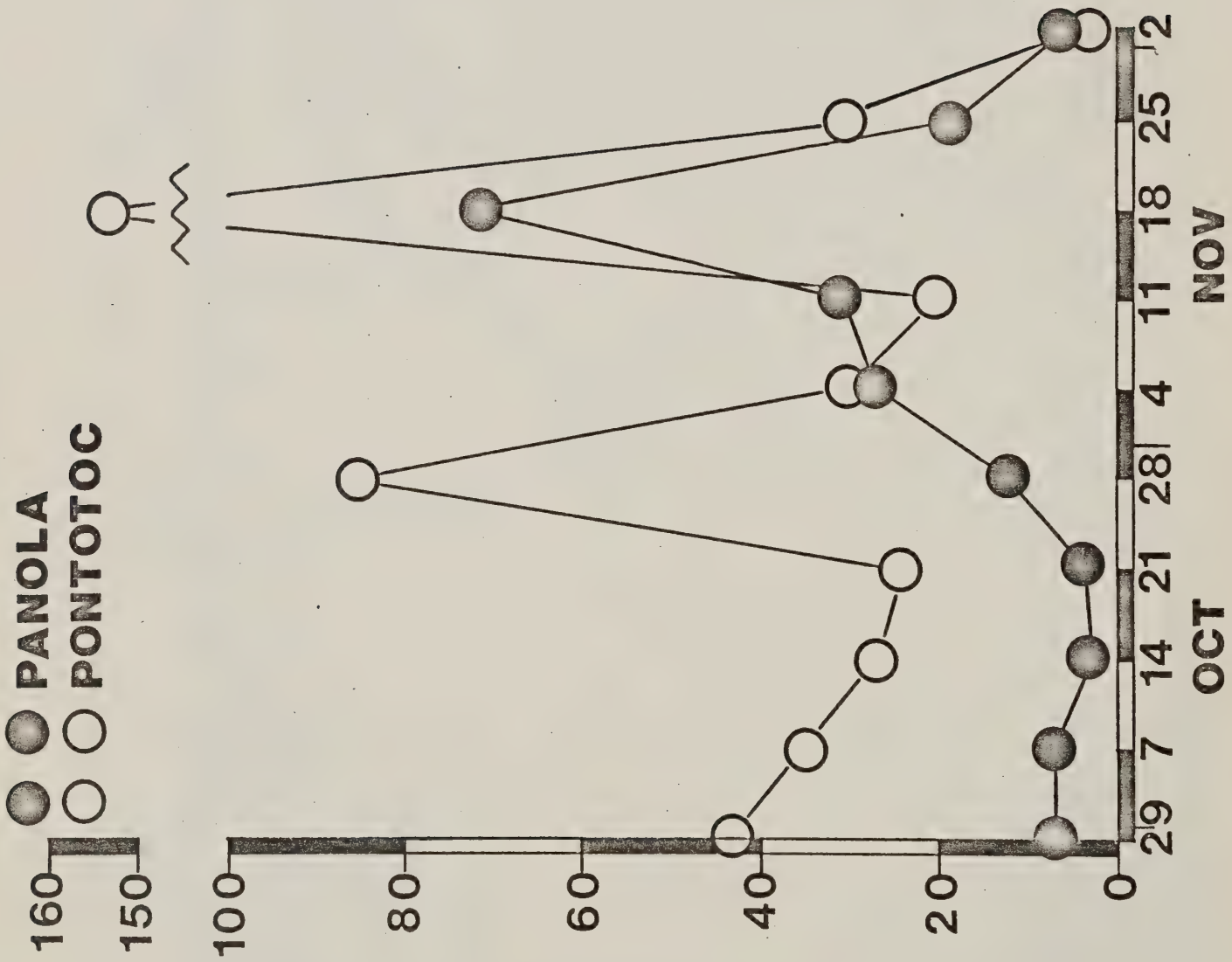


Fig. 12. - Adult boll weevils captured in infield traps in the fall in Panola and Pontotoc Counties in 1978

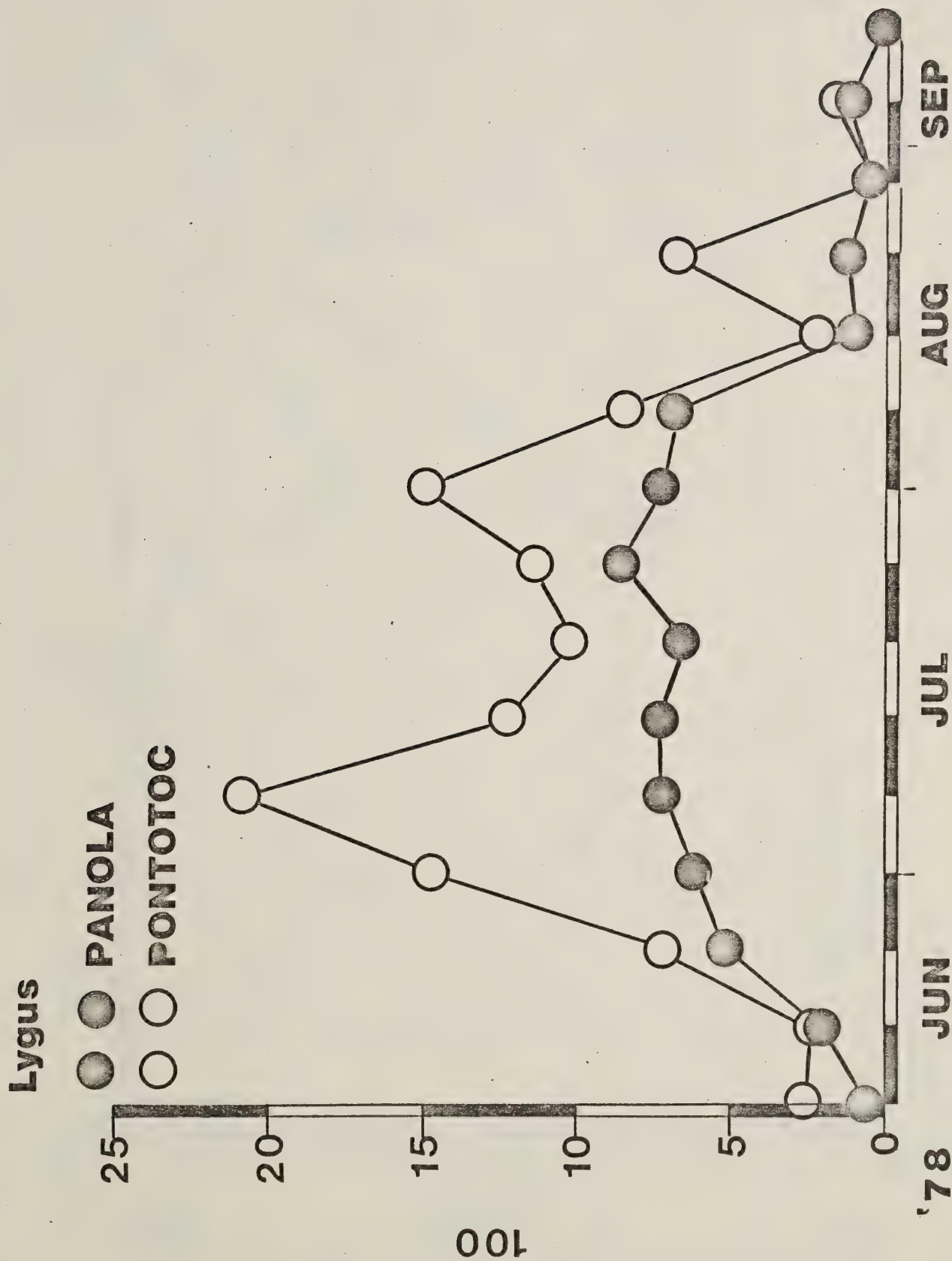


Fig. 13. - Per acre tarnished plant bug populations based on D-vac samples in Panola and Pontotoc Counties, 1978

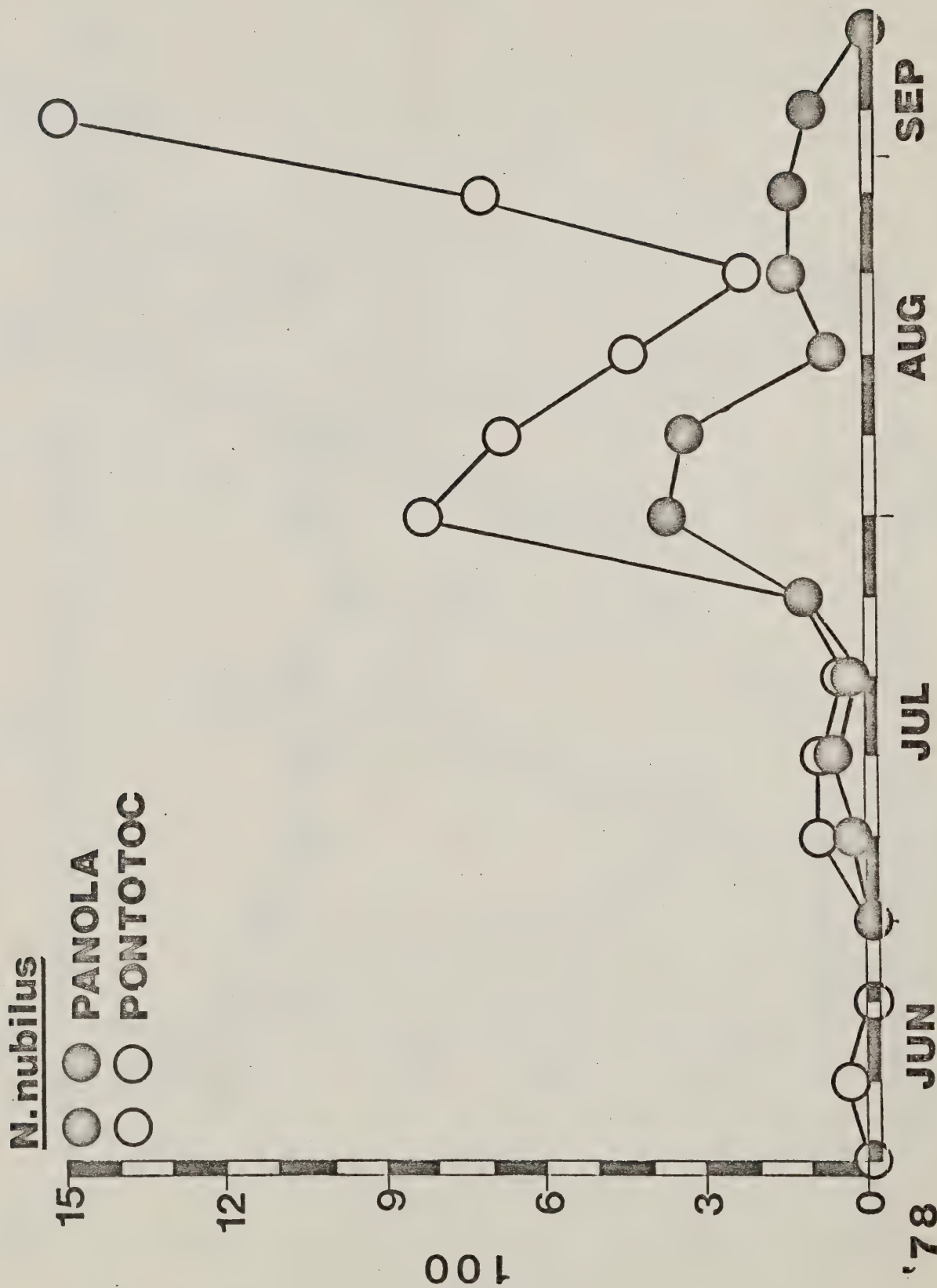


Fig. 14. - Per acre clouded plant bug populations based on D-vac samples in Panola and Pontotoc Counties, 1978

1978 Panola Lygus sp.

▼▼▼ Vacuum
 ●●● Terminal
 □□□ Sweep

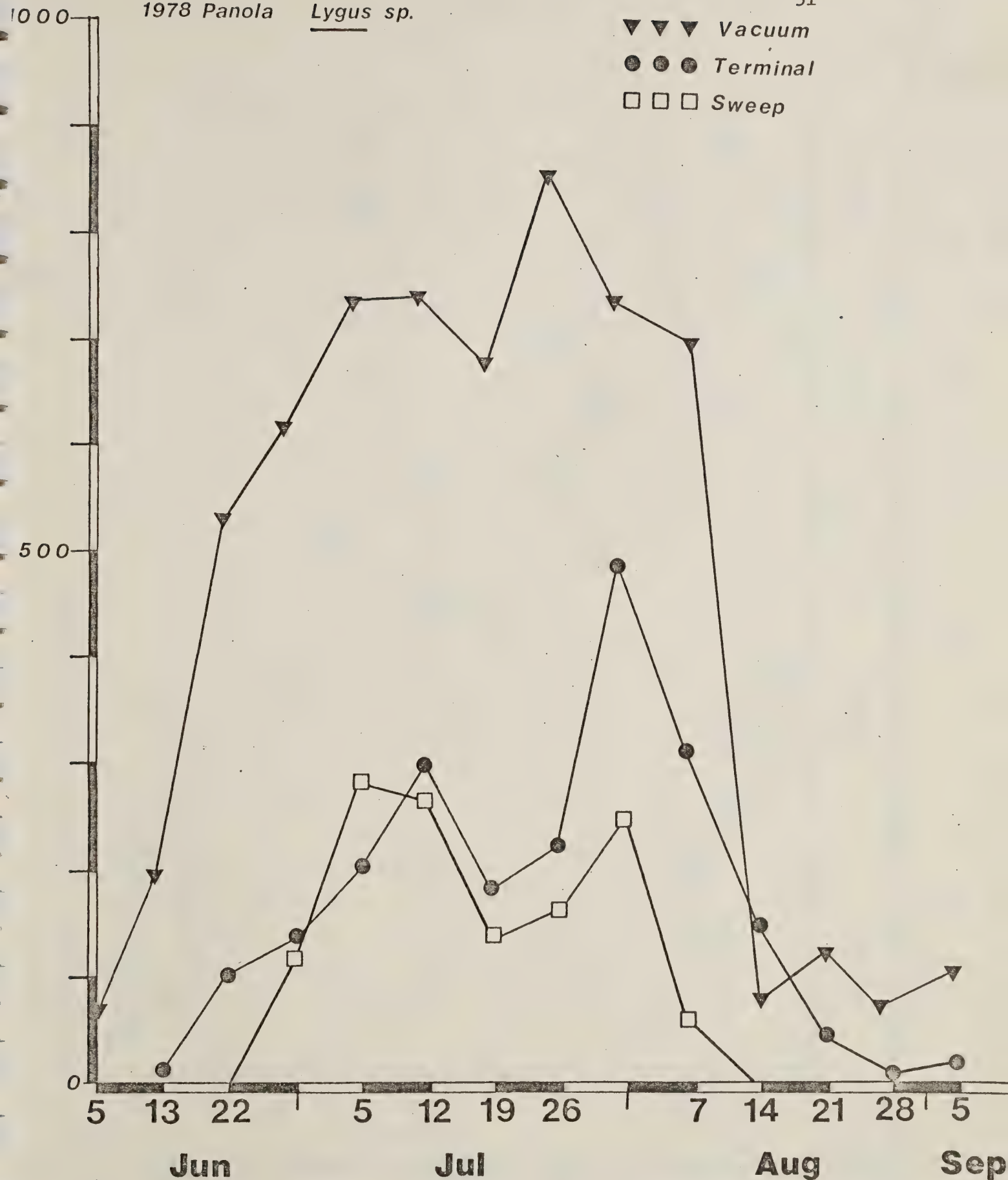


Fig. 15. - Per acre populations of plant bugs monitored semi-weekly with D-vac, sweep-net and visual methods in 20 fields in Panola County, 1978.

1978 Pontotoc

Lygus sp.

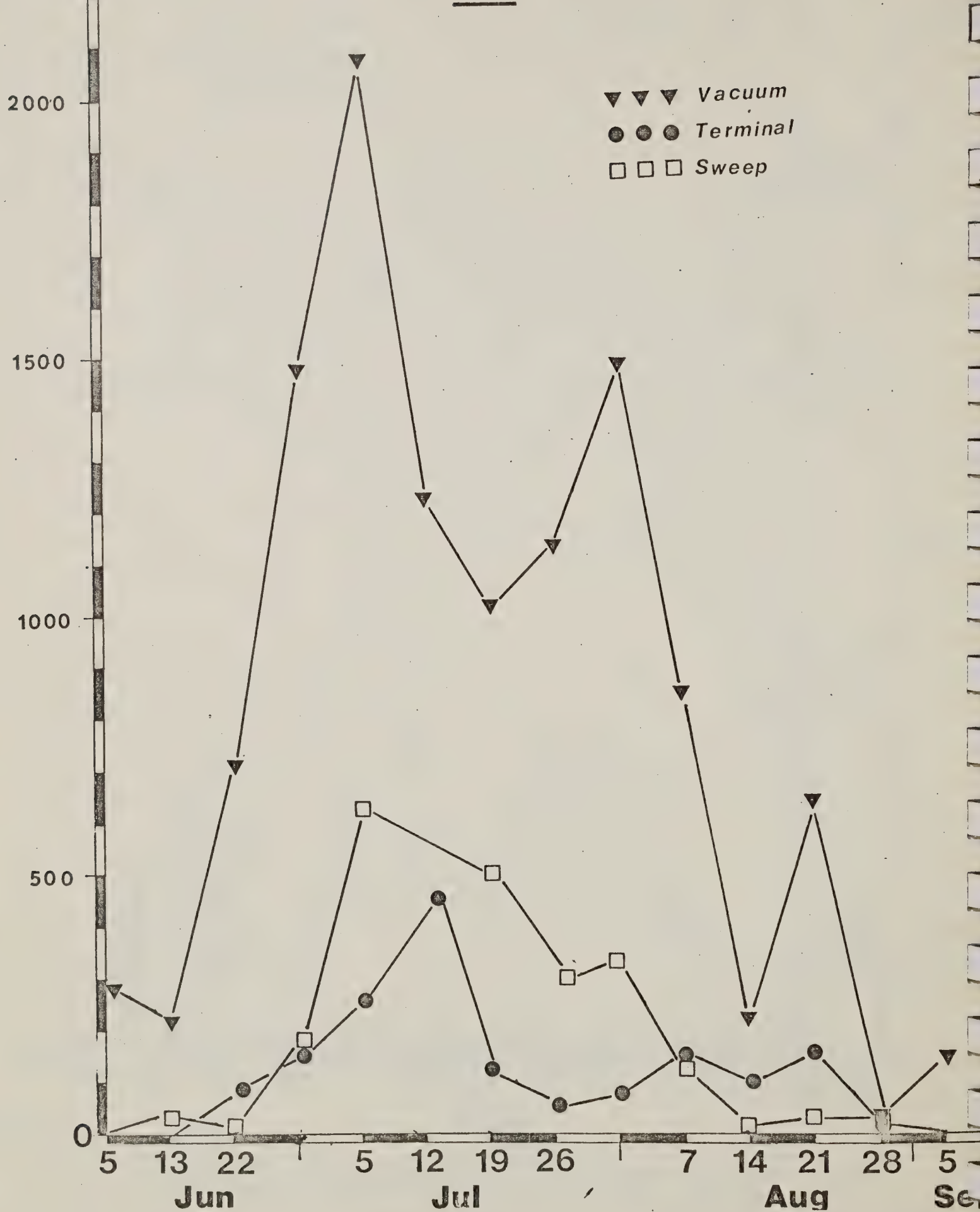


Fig. 16. - Per acre populations of plant bugs monitored semi-weekly with D-vac, sweep-net, visual methods in 10 fields in Pontotoc County, 1978.

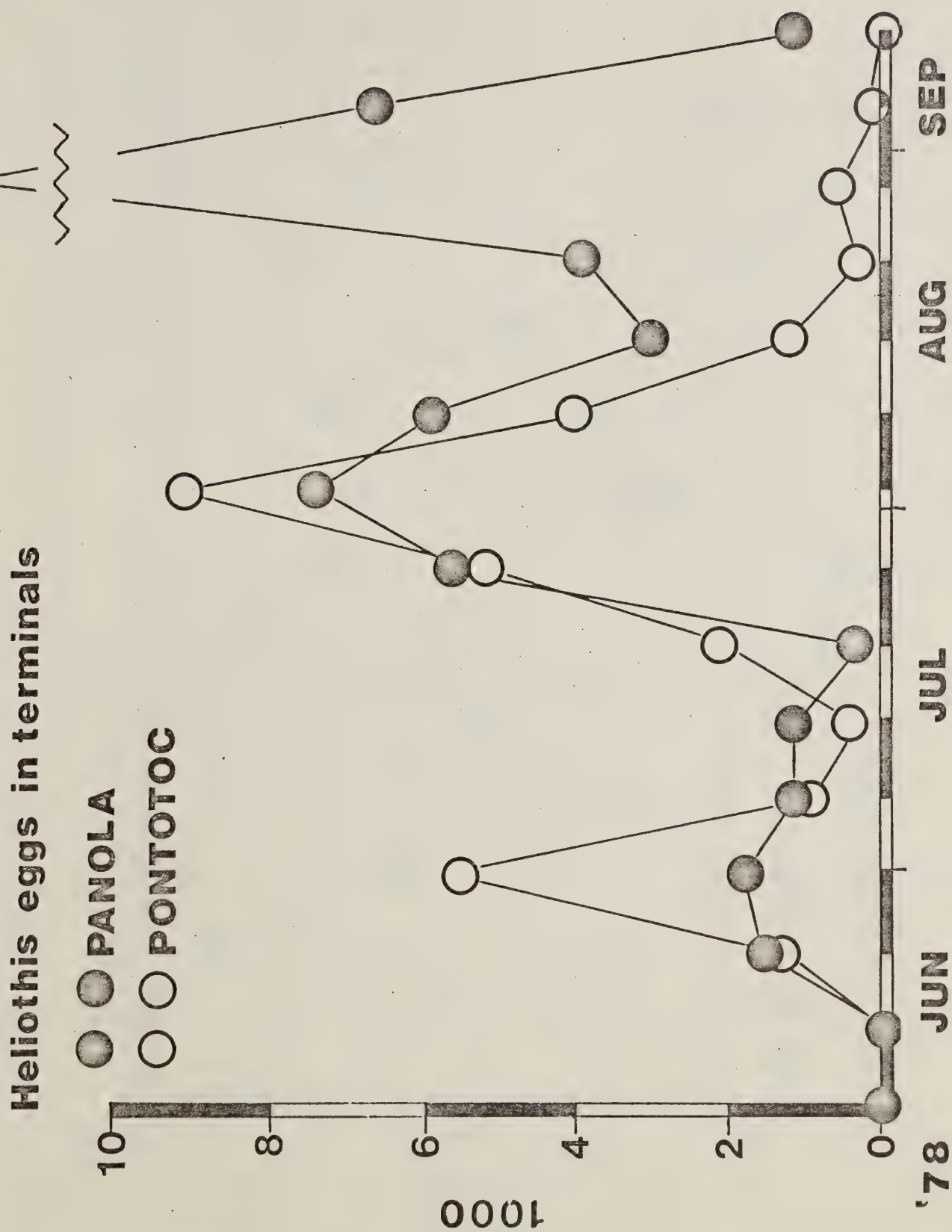


Fig. 17. - *Heliothis* spp. eggs per acre in cotton terminal buds in Panola and Pontotoc Counties in 1978

Heliothis larvae (term.)

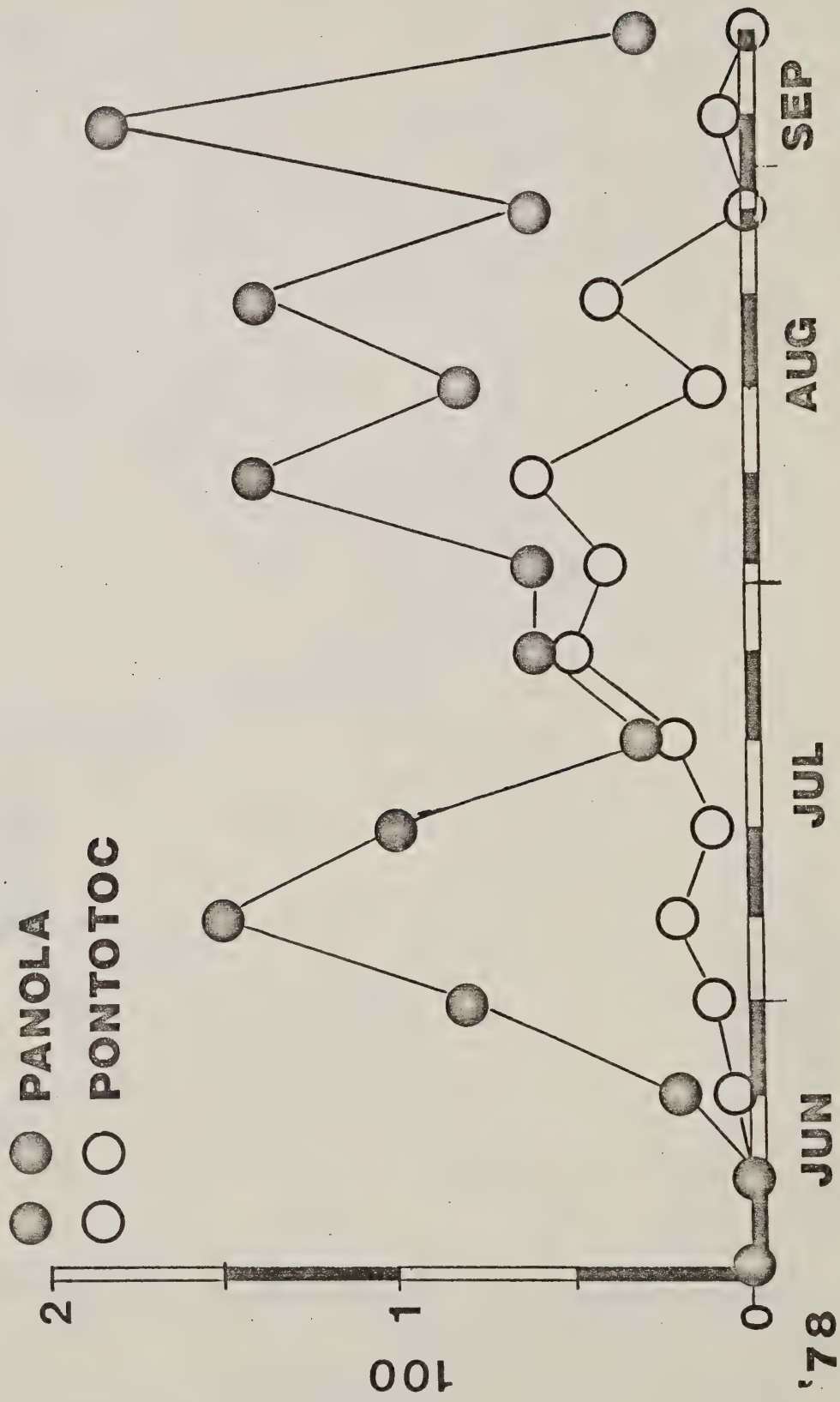


Fig. 18. - *Heliothis* spp. larval populations per acre in cotton terminal buds in Panola and Pontotoc Counties, 1978

Heliothis Larvae

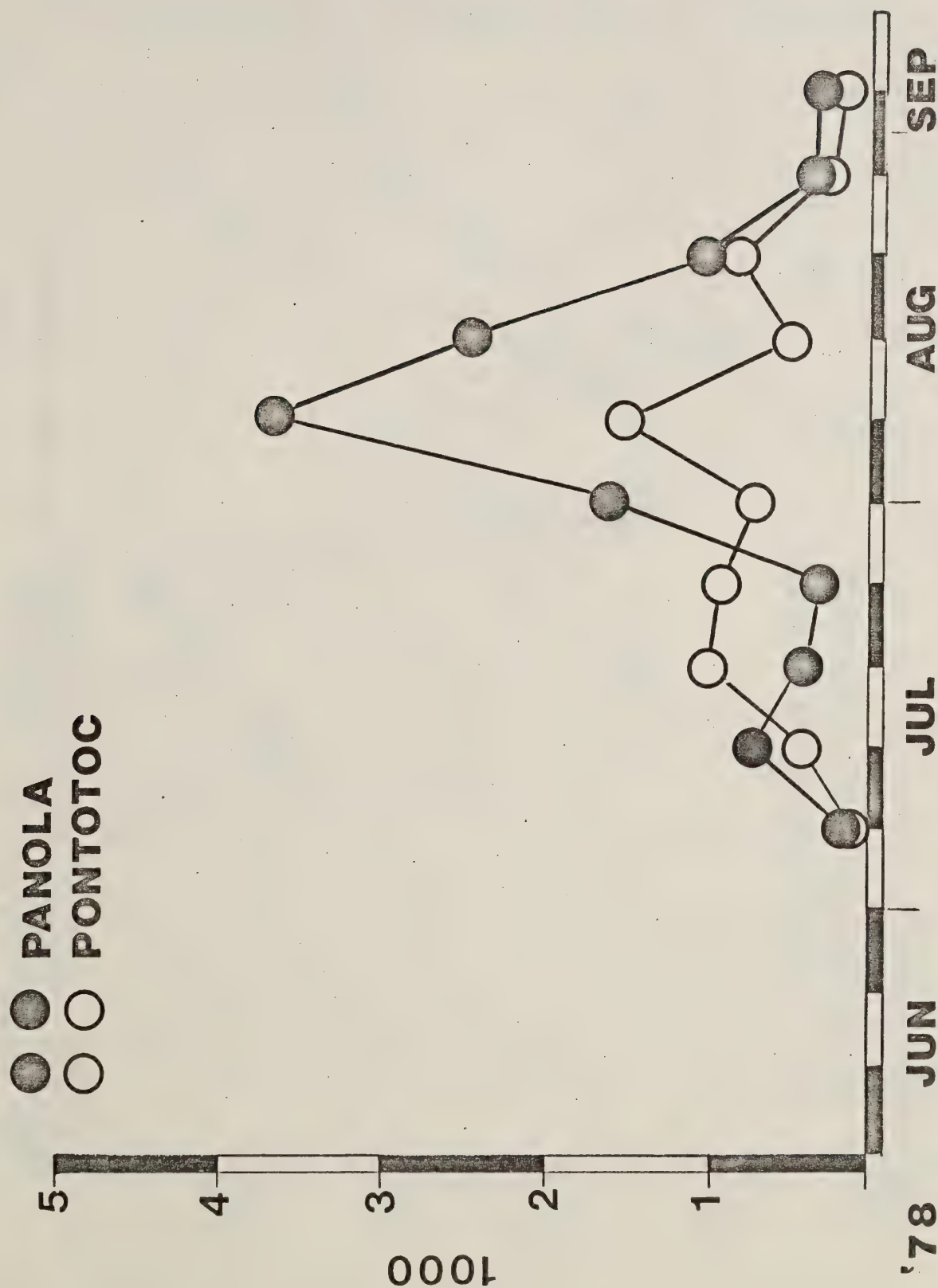


Fig. 19. - *Heliothis* spp. larval populations per acre in squares, blooms and bolls in Panola and Pontotoc Counties, 1978

PONTOTOC

- HELIOTHIS LARVAE
- DAMAGED SQUARES

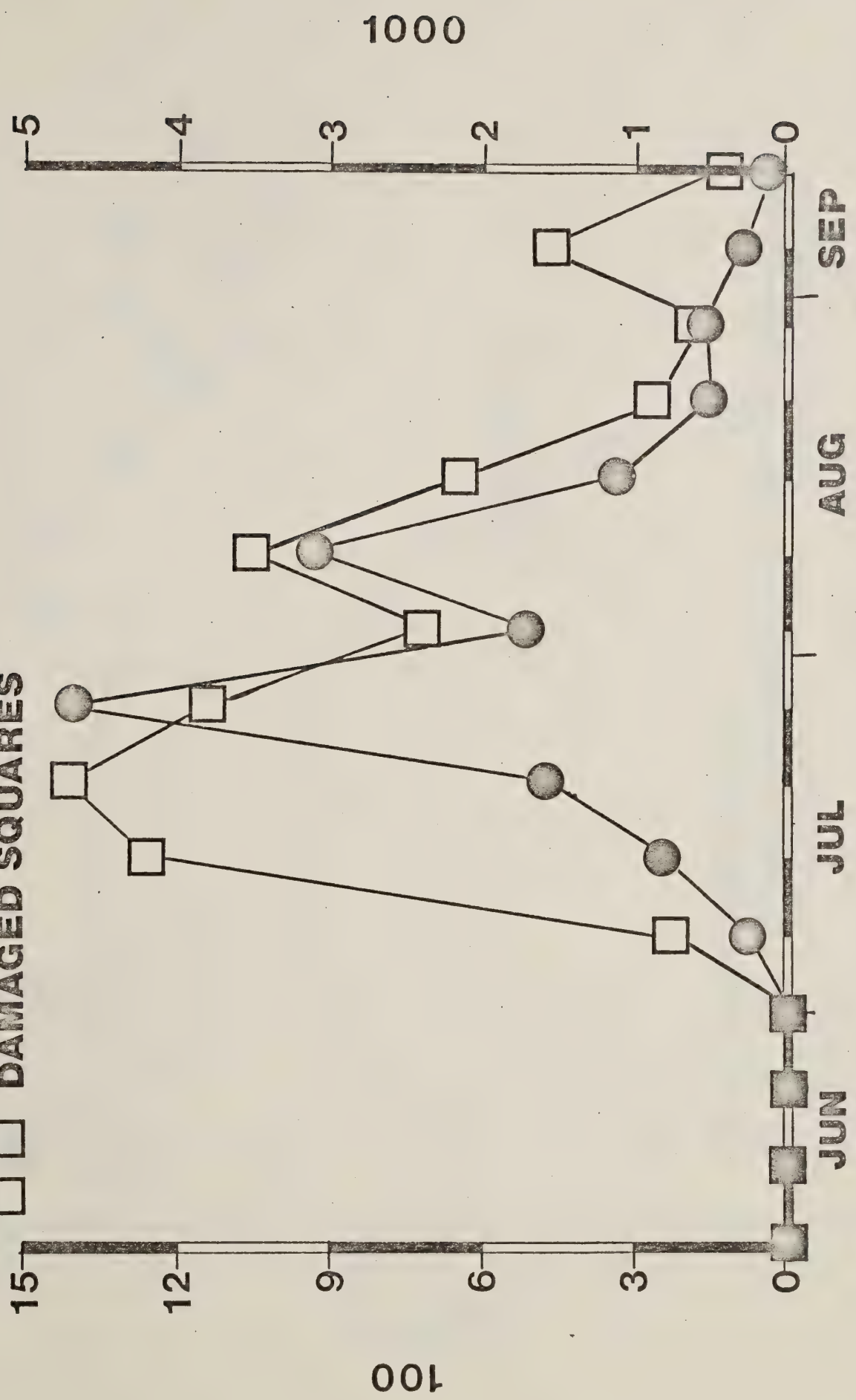


Fig. 21. - *Heliothis* spp. larval populations in squares on left and damaged squares per acre in Pontotoc County, 1978.

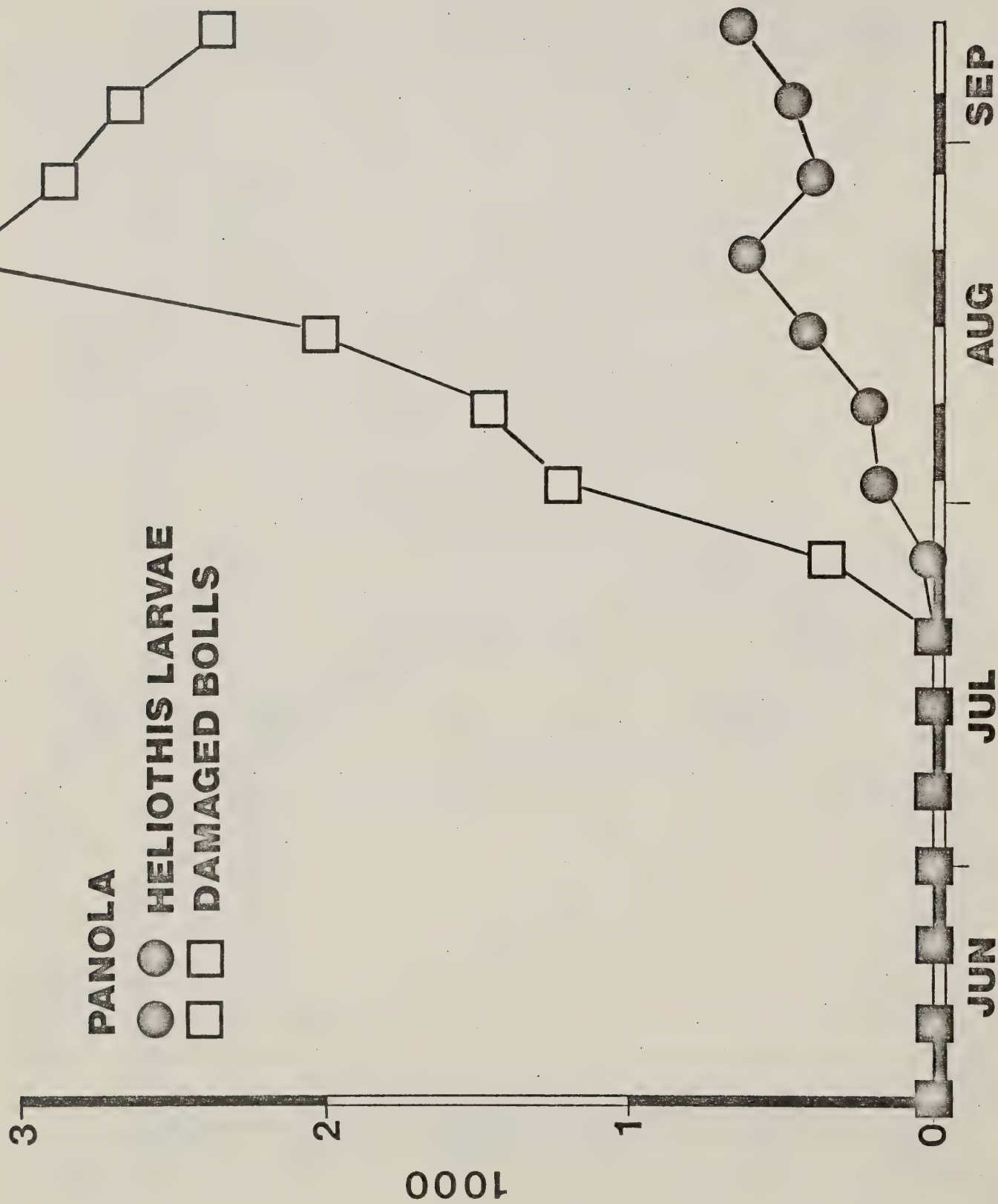


Fig. 22. - *Heliothis* spp. larval populations in bolls and damaged bolls per acre in Panola County in 1978

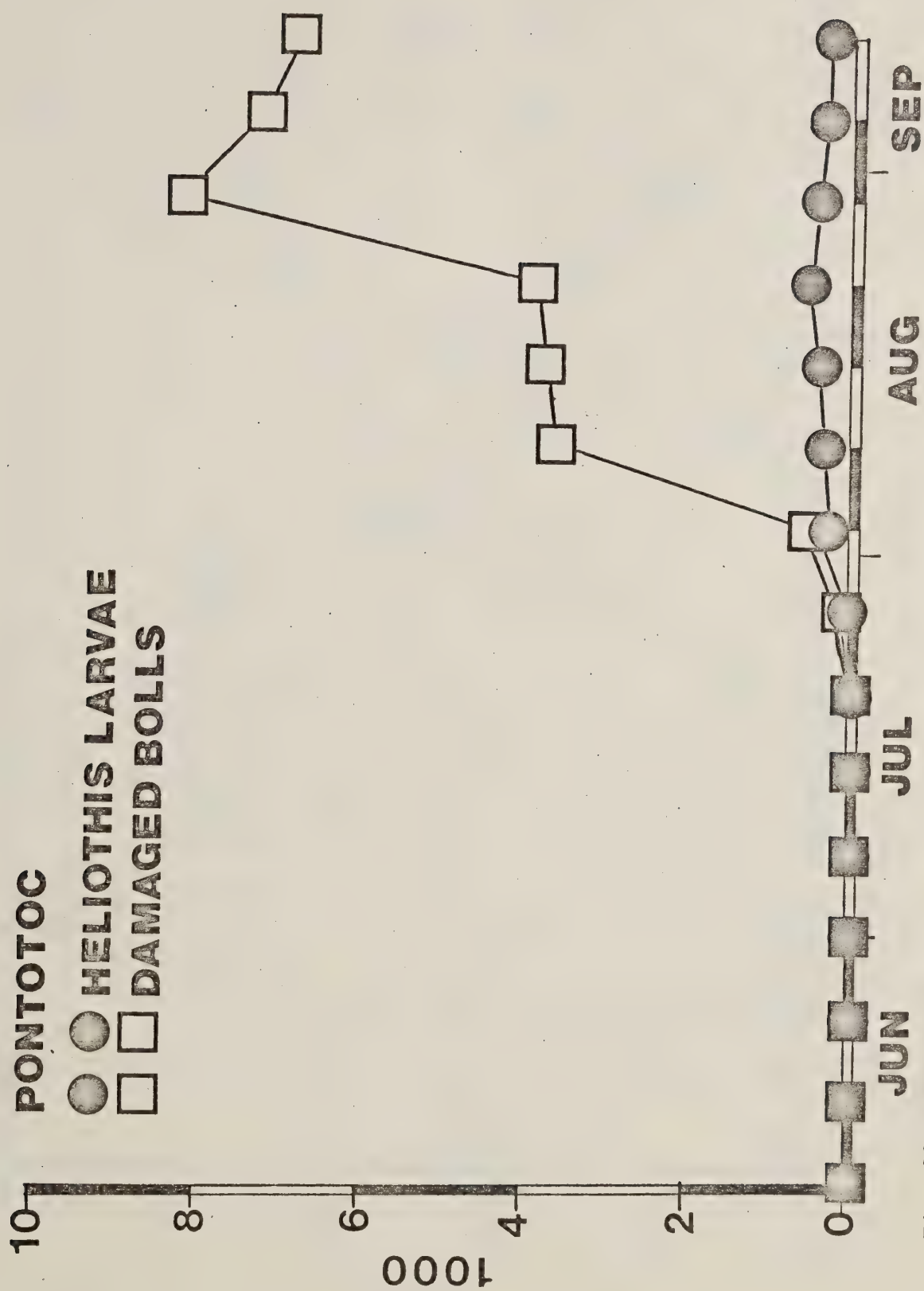


Fig. 23. - Heliothis spp. larval populations and damaged bolls per acre in Pontotoc County, 1978

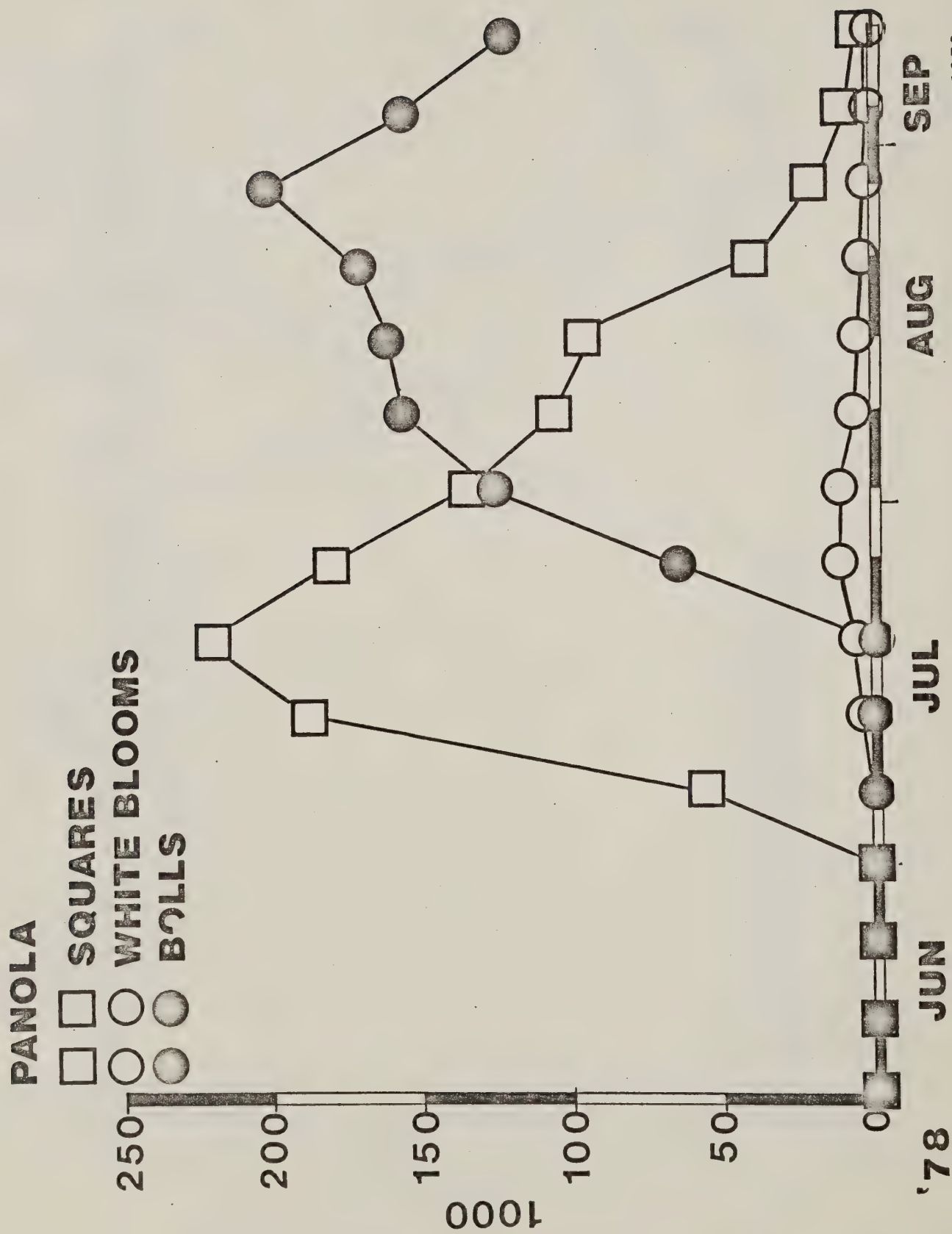
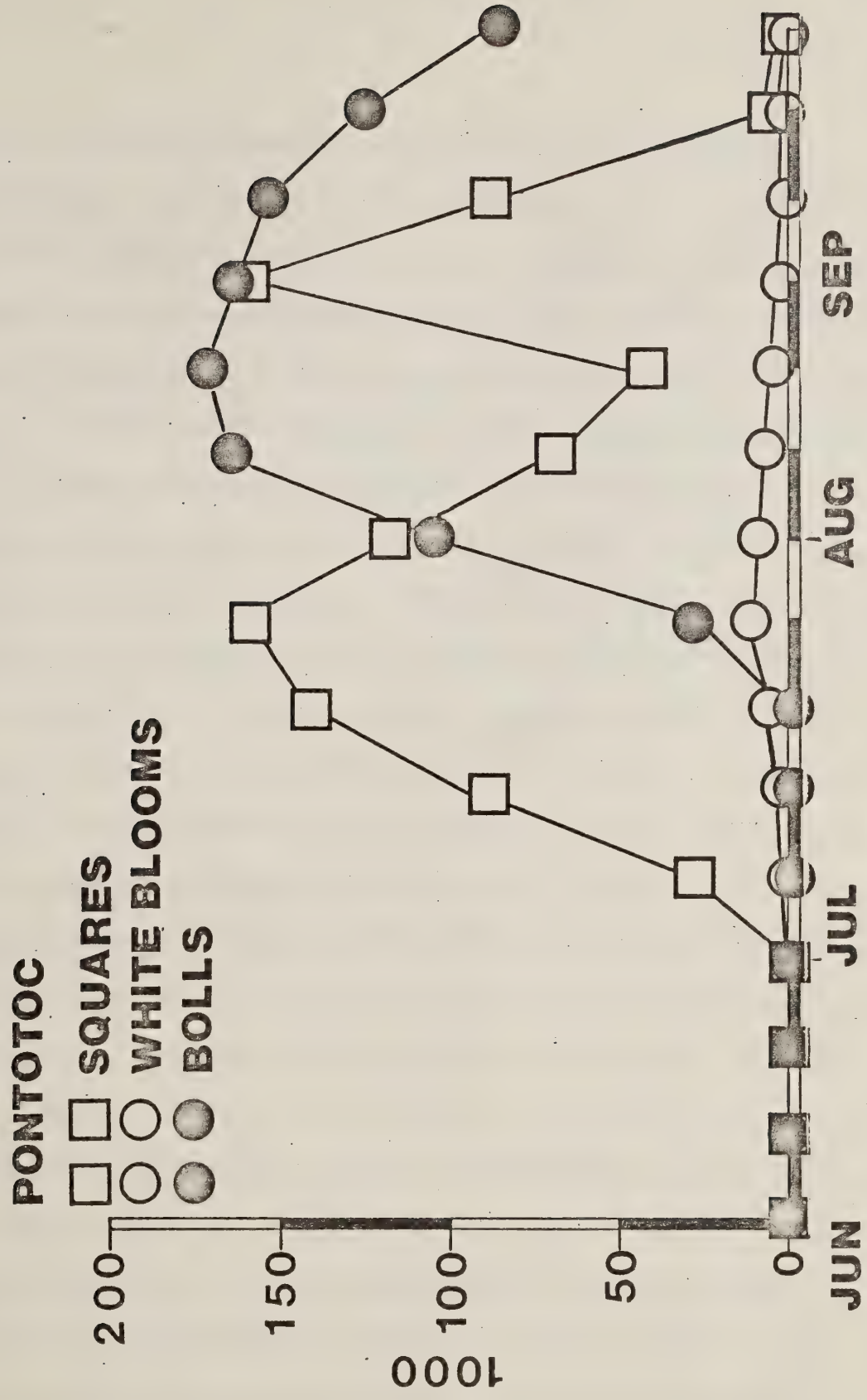


Fig. 24. - Seasonal production of squares, blooms, and bolls per acre in Panola County, 1978



Beneficial Insects.--The use of beneficial arthropods, as a part of cotton pest population management, has engendered considerable discussion, but practical information has been lacking. The OPM data from 1977 and 1978, along with information collected from additional studies in the mid-Delta, has given us some insight into the role entomophages play in cotton pest population management.

The 1977 and 1978 total beneficial arthropod population per acre curve for Panola County, Fig. 26, show the typical population pattern where populations increase rapidly during June and peak in mid- to late-July. From previous studies, we have observed total predatory population peaks varying by more than a month. Figure 27 shows beneficial arthropods for 1977 and 1978 in Pontotoc County and figure 28 compares populations in the two counties for 1978. Spring weather, planting date, and wild host plants affect the time and rapidity with which predators colonize cottonfields. The 1978 insect predator populations started the season at much lower levels than the 1977 populations and the mid-season peaks were about one-half the 1977 level. The hunting spider population started at about the same level as in 1977 but peaked at a much higher level. In 1977, in both counties, all beneficial species declined sharply after mid-August. Although deleterious effects of insecticides might be suspected, similar declines occurred in untreated fields. Figure 29 compares the important beneficials in Panola and Pontotoc Counties for 1978. The resurgence of beneficials in Pontotoc County is quite interesting since it has not been seen in any of our previous studies. Figure 30 compares the important beneficial arthropods in Panola County and in Washington County in the mid-Delta.

Figures 24 and 25 show the average fruiting curves for Panola and Pontotoc Counties respectively. The Panola County squaring curve is typical of fields previously studied. The Pontotoc squaring curve shows a resurgence in squaring in late August. This squaring resurgence corresponds precisely with the increase of beneficial arthropods in this county. Heliothis spp. eggs per acre are presented in Fig. 17. When these data are studied with the fruiting and beneficial arthropod data, explanations for differences in Heliothis spp. populations becomes evident. Although both counties had similar egg peaks in June and July, the third peak was absent in Pontotoc County. This resulted in a very low Heliothis sp. larval population in Pontotoc County (Fig. 19).

The most abundant insect predator species in both counties were the big eyed bug, Geocoris punctipes and the insidious flower bug Orius insidiosus. Figure 31 shows that the per acre population of G. punctipes declined in both counties, but less drastically in Pontotoc County. In fact, the G. punctipes population was twice as high in Pontotoc County (late in the season) as in Panola County.

The average O. insidiosus populations were very similar in the two counties through July, but O. insidiosus populations sharply increased later in Pontotoc to a higher peak than earlier in the season (Fig. 32). This late O. insidiosus increase certainly could have been a major factor in reducing the Heliothis sp. egg numbers during late season in Pontotoc County. These data indicate a strong relationship between plant fruiting and beneficial arthropod population levels. Several additional predaceous species populations

rebounded in Pontotoc County when squaring was reintiated. The web building spiders were especially noticeable during late season (Fig. 70). Populations of C. maculata and C. vespertinus in the two counties may be noted in figures 33 and 34.

These data confirm previous reports of strong relationships between crop maturity and fluctuations in beneficial arthropod populations. Pest management strategies attempting to employ the regulatory impact of predaceous species should be aware of plant - predator interactions to take full advantage of natural controls.

Comparative populations of beneficial arthropods and Heliothis spp. larvae, insecticide applications for Heliothis spp. and yields in 20 and 10 intensively monitored fields in Panola and Pontotoc Counties, respectively, are shown in Figures 35 through 64.

Panola County

Twelve of 20 fields in Panola County received late-season application of insecticides for control of Heliothis spp. ranging from 1 to 6 with an average of 2.8.

Three fields, 4, 16 and 41 (Figs. 37, 39 and 47) were not treated for thrips control. Beneficial arthropod populations were initially low in fields 4 and 16 but peaked at 12,000 and 18,000 per acre, respectively. Populations in field 41 were higher initially than in most fields and peaked at 16,000. Heliothis spp. populations peaked at 5,000 and 2,000 per acre in early July in fields 4 and 16 but increased to 5,000 in the latter field in early August. Populations were low in field 41 peaking at 3,000 per acre in early September. The 3 fields received an average of 2 late-season insecticide

applications and the average yield in the 2 fields for which yields are available was 510 lbs of lint per acre.

Four fields 2, 3, 54 and 61, (Figs. 35, 36, 51 and 53) were treated with conventional insecticides in late May or early June for thrips control. Initial arthropod populations were low peaking at 9 to 12,000 per acre in fields 2, 3 and 54 and at 24,000 in field 61. All had high early July Heliothis spp. larval populations with subsequent decreases and increases in August. They were treated an average of 2.5 times for Heliothis spp. control. The average yield was 705 lbs of lint per acre.

Fields 35, 36, 45 and 50 (Figs. 45, 46, 49 and 50) received aldicarb in-furrow at planting. Arthropod populations were initially low but increased to 18,000, 17,000, 16,000 and 9,000 per acre respectively. Heliothis spp. larval populations in field 35 were 3,000 per acre early in July and decreased thereafter. The grower treated this field along with his other acreage where populations were higher. In field 36, populations increased to 6,000 per acre on August 1 when insecticidal control was initiated, stayed at 4,000 to 5,000 per acre to mid-August and decreased thereafter. Heliothis spp. larval populations in field 50 increased to 2,000 in early August and peaked at 5,000 per acre. These fields received an average of 4.2 insecticide applications for Heliothis spp. control and the average yield was 666 pounds of lint per acre.

Field 63, (Fig. 54) received aldicarb in-furrow at planting plus a foliar application. The beneficial arthropod population neared 8,000 per acre early in June, decreased to about 5,000 per

acre, peaked at 8,000 and declined thereafter. The Heliothis spp. populations peaked at 13,000 per acre when insecticidal treatment began. The field received 4 insecticide applications and the yield was 972 pounds of lint per acre.

All growers ignored the early July Heliothis spp. populations. Fields receiving no early treatment received only two insecticide applications later in the season. Those treated with foliar insecticide applications early in the season received 2.5 late-season insecticide applications; those treated with aldicarb received 4.2 late-season insecticide applications, and the only field treated with aldicarb plus a foliar insecticide application received 4 late-season applications.

Seven fields, 13, 17, 21, 27, 30, 31 and 43 (Figs. 38, 40, 41, 42, 43, 44 and 48) which received no late-season treatment for control of Heliothis spp. received foliar insecticide applications early in the season. All but field 13 had low initial beneficial arthropod populations with good increases to early and mid-August. Populations in mid July peaked at 3,000 to 6,000 larvae per acre in fields 13, 17, 21, 27 and 30 but were low throughout the season in fields 31 and 43. Field 59, fig. 52, received an in-furrow application of aldicarb. The beneficial arthropod population was similar to that in other fields. The Heliothis spp. population was low until late-July when it became extremely high. Apparently the plants were pretty far along toward maturity when the field received a 4 inch rain causing plants to continue growth and fruiting. Plants in adjoining fields did not continue growth resulting in Heliothis

spp. concentration in this field. However, this generation of larvae developed only in the top part of the plants with bolls on lower parts of plants too far along toward maturity to be damaged. From August 1 to 11 boll damage ranged only from 0.5 to 3%.

Yields in the fields receiving late treatment averaged 650 pounds of lint per acre versus 652 pounds in fields that did not receive late treatment.

Pontotoc County

None of the ten fields in Pontotoc County were treated for control of thrips. Four of the ten fields received treatment for Heliothis spp. late in the season ranging from 1 to six applications with an average of 2.5.

Fields 8, 10, 12, and 14 (figs. 57, 58, 59 and 60) received applications of insecticides for late-season control of Heliothis spp. In field 8 beneficial arthropod populations were initially low and peaked at 18,000 in late July when it decreased drastically. It resurged to high levels after mid-August. Heliothis spp. populations were low but increased rapidly at the time when beneficial arthropod populations decreased, peaking at 8,000 on August 7. One insecticide application was made in mid-August and populations decreased thereafter.

In field 10, beneficial arthropod populations were initially low increasing to 6,000 per acre in late June, decreased somewhat and then failed to recover when late-season treatment began on July 5. It resurged after mid-August. The Heliothis spp. populations was low but increased to 9,000 per acre when the application interval was extended from July 14 to 28 between the second and third application.

Four additional insecticide applications were made and Heliothis spp. populations were reduced to low levels for the remainder of the season.

In field 12, beneficial arthropod populations were initially low but peaked at 23,000 per acre about August 1 when the initial insecticide application was made. It resurged in late August, decreased by September 1 and increased spectacularly in September. Heliothis spp. populations increased when beneficial arthropod populations decreased peaking at 6,000 per acre on August 7. Two insecticide applications reduced the larval numbers to low levels.

In field 14, the initial beneficial arthropod population was low and peaked at 15,000 in early August decreasing drastically when the only insecticide application was made. It resurged after mid-August. The Heliothis spp. population gradually increased after mid-July peaking at 5,000 per acre when the insecticide application was made decreasing to low levels thereafter.

Fields 4, 7, 25, 26, 27, and 28 (Figs. 55, 56, 61, 62, 63 and 64) were not treated for control of Heliothis spp. In field 4 beneficial arthropod populations peaked at 23,000 in mid-July, decreased to 9,000 in late July, increased to 20,000 in early August, decreased slightly and resurged to 24,000 in late August. Heliothis spp. populations were at low levels throughout the season.

In field 7, the beneficial arthropod population was somewhat lower than in field 4. The Heliothis spp. population peaked at 2,000 in mid-July but decreased thereafter.

In field 25, the beneficial arthropod populations peaked at 23,000 on July 19 and decreased drastically, thereafter leveling off at about

10,000 per acre. The Heliothis spp. population peaked at 12,000 per acre at the decline in beneficial arthropod populations. However it decreased thereafter to about 1,500 per acre.

In field 26, the beneficial arthropod population peaked at 2,500 in mid-July but remained at about 10,000 per acre thereafter. The Heliothis spp. population peaked at about 5,000 per acre in late July after the arthropod population decreased in mid-July. It decreased thereafter but peaked again at about 9,000 per acre in late August.

In field 27, the beneficial arthropod population peaked at 22,000 in early July, decreased to 8,000 in mid-July, increased to 18,000 in late July, decreased in early August and then resurged to high levels in late August. The Heliothis spp. population peaked at 4,000 per acre in mid-July with the beneficial arthropod population decrease but decreased when the beneficial arthropod populations rebounded.

In field 28, the beneficial arthropod population leveled off at about 12,000 per acre, decreased somewhat in early August and then resurged to about 25,000 per acre in late August. The Heliothis spp. population peaked at 7,000 in early August when the beneficial arthropod population decreased but it decreased after the beneficial arthropod populations rebounded.

The Pontotoc County fields receiving an average of 2.5 insecticide application for control of Heliothis spp. larval populations produced an average yield of 531 pounds of lint. Fields receiving no late treatment produced an average yield of 604 pounds of lint per acre.

It has previously been noted that beneficial arthropod populations declined in mid-summer whether insecticides were applied or not. This phenomenon occurred in most of the Pontotoc fields but occurred earlier

because dry weather caused the plants to mature at that time. Rains came in August causing the plants to regrow and to fruit again. Beneficial arthropods increased to previous or higher levels at that time. Thus, as indicated in the discussion in the first part of this section, it appears that beneficial arthropod populations are regulated by the physiological condition of the cotton plants. Populations are high during normal growth and fruiting of plants, decrease when plants begin to mature, and resurge later in the season if plants return to a growing and fruiting condition.

Spiders

Hunting spider populations were greater in 1978 than in 1977 in both counties, Fig. 65 and 66, but were similar in the two counties until mid-August when populations were somewhat greater in Pontotoc County for the remainder of the season, Fig. 67. Fig. 68 shows that Heliothis spp. larval populations in squares, blooms and bolls increased in August in Panola County when population of hunting spiders and other important beneficial arthropods decreased. The drastic reduction in the spider and other important beneficial arthropod populations did not occur and Heliothis spp. populations remained at much lower levels in Pontotoc County, Fig. 69. Comparative populations of web building spiders in Panola and Pontotoc Counties are shown in Fig. 70. Populations were similar in the two counties and decreased drastically in August. A resurgence occurred in September especially in Pontotoc County probably because of plant regrowth and renewal in fruiting.

Figures 71 and 72 show comparative populations of hunting and web building spiders and other beneficial arthropods in Panola and Pontotoc counties, respectively in 1977.

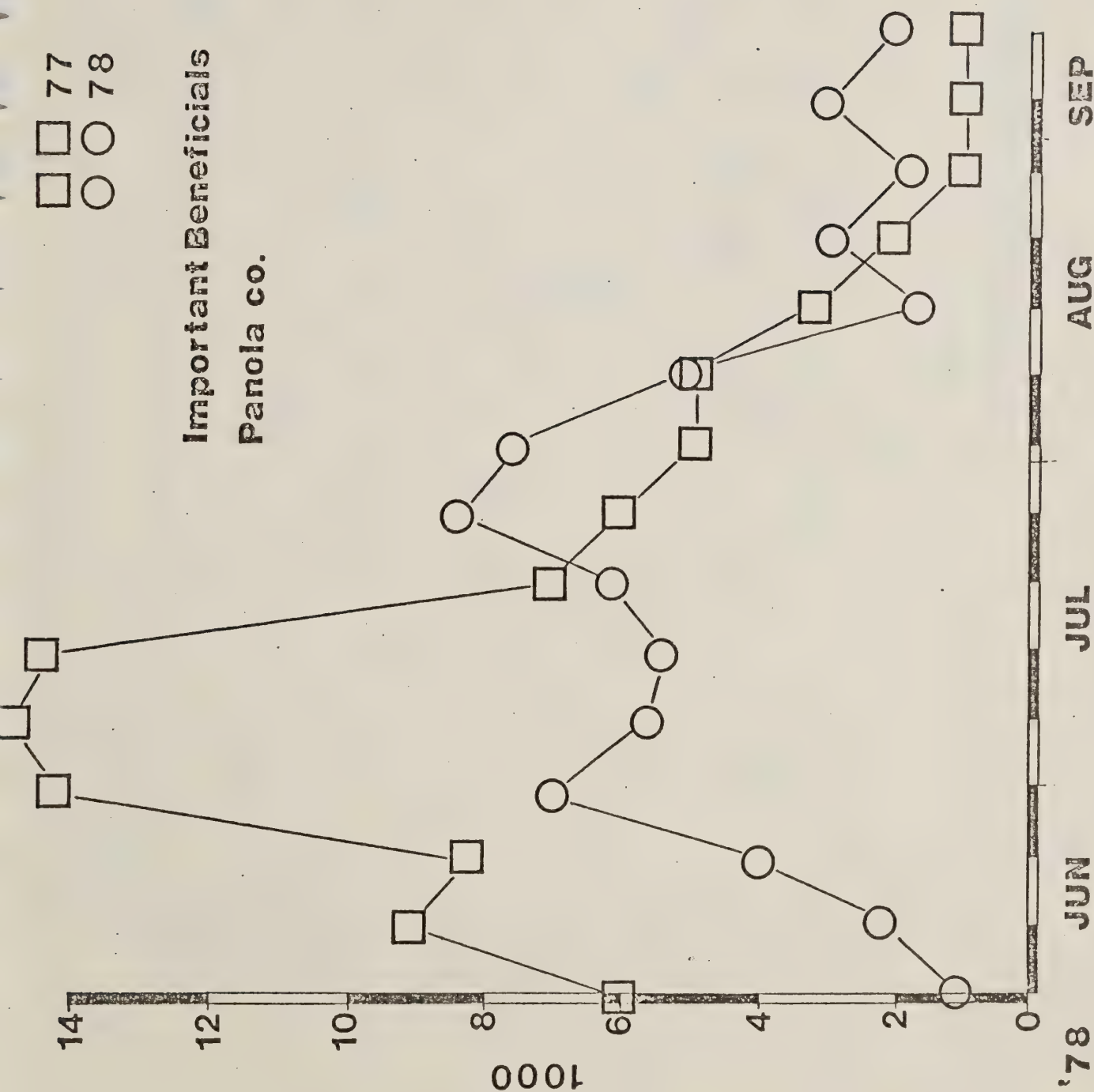


Fig. 26. - Important beneficial arthropod populations per acre based on D-vac samples in Panola County, 1977 and 1978

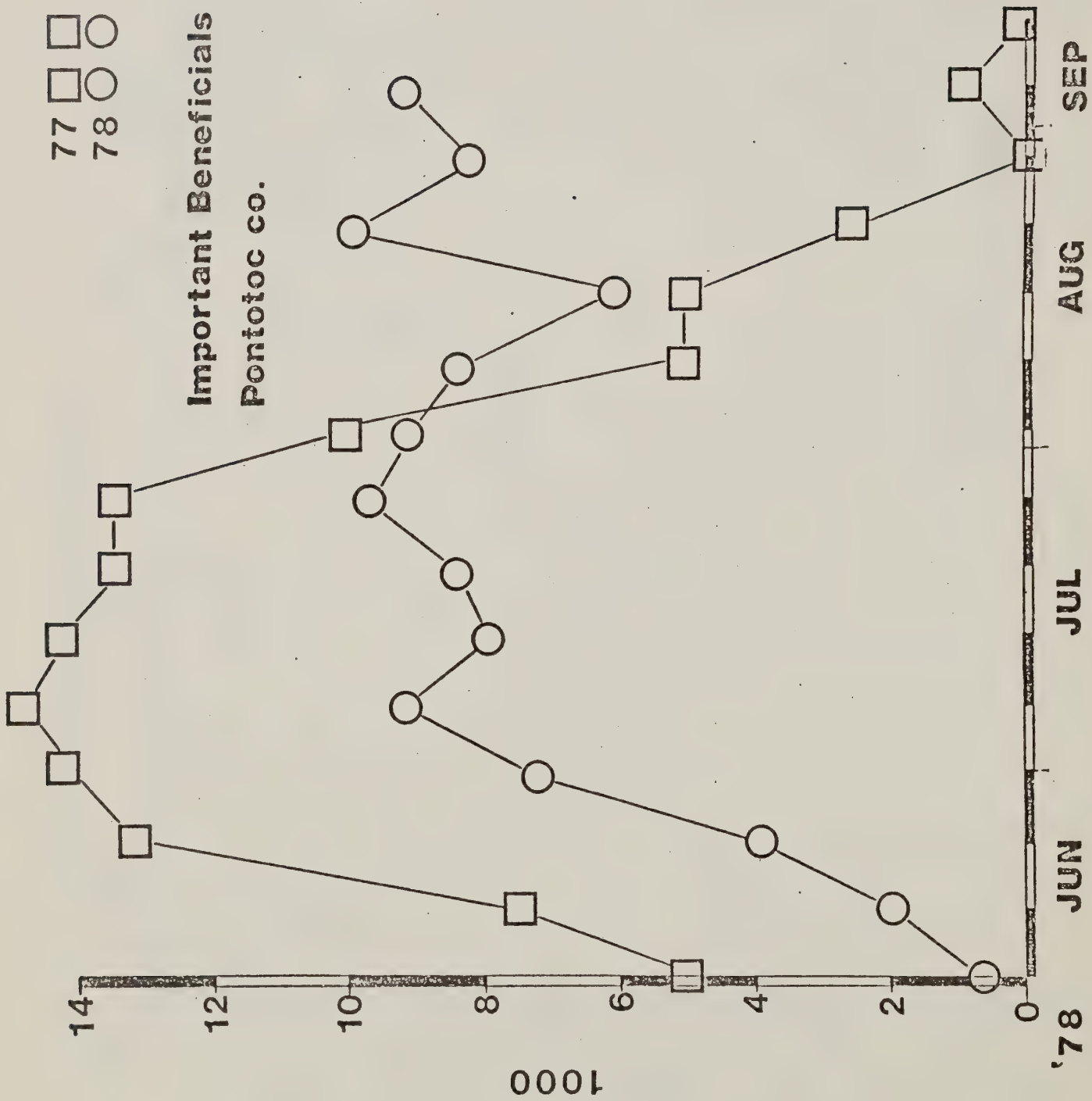


Fig. 27. - Important beneficial arthropod populations per acre based on D-vac samples in Pontotoc County, 1977 and 1978

Total Beneficial Arthropods

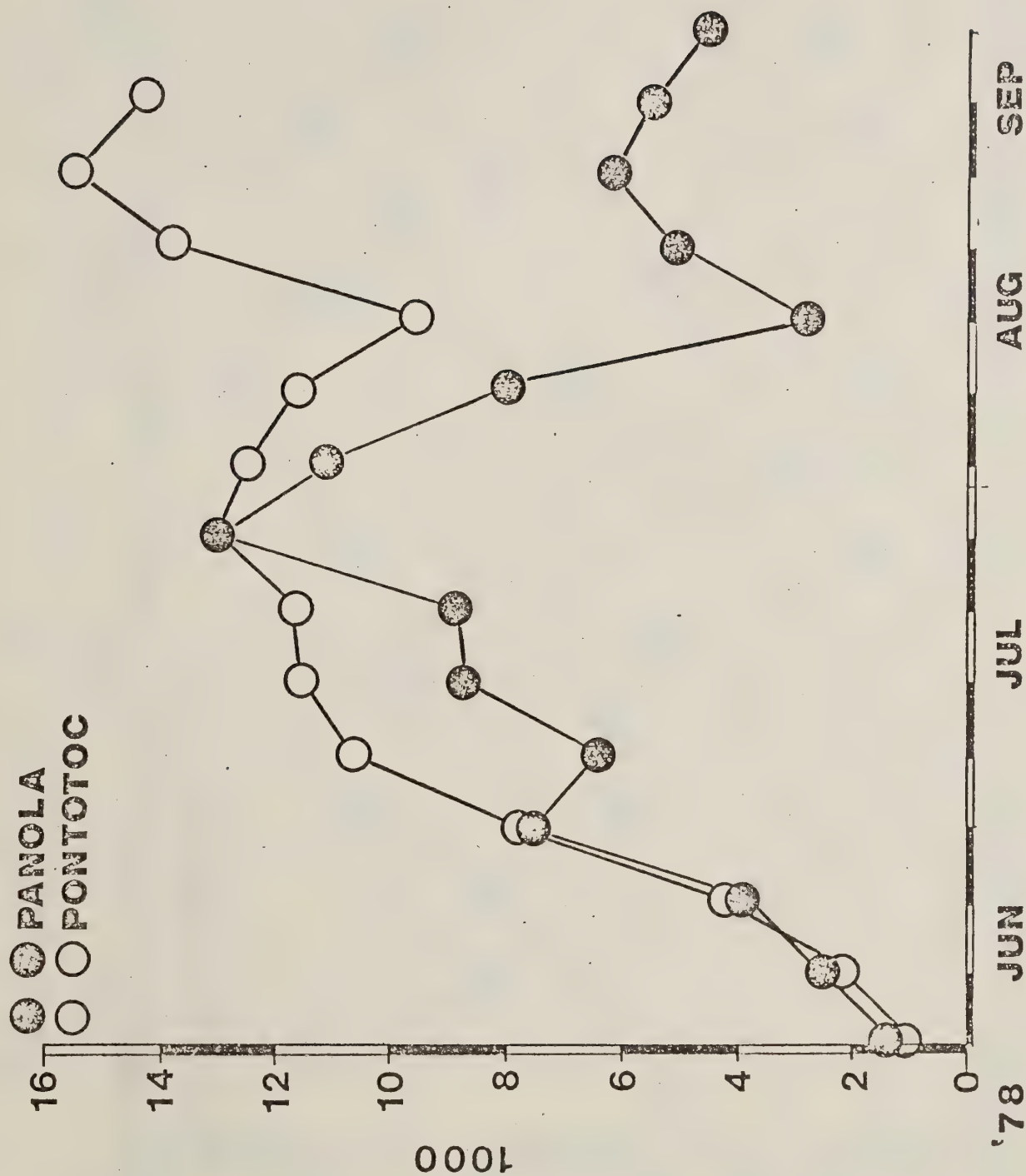


Fig. 28. - Total beneficial arthropod populations per acre based on D-vac samples in Panola and Pontotoc Counties, 1978

IMPORTANT BENEFICIALS

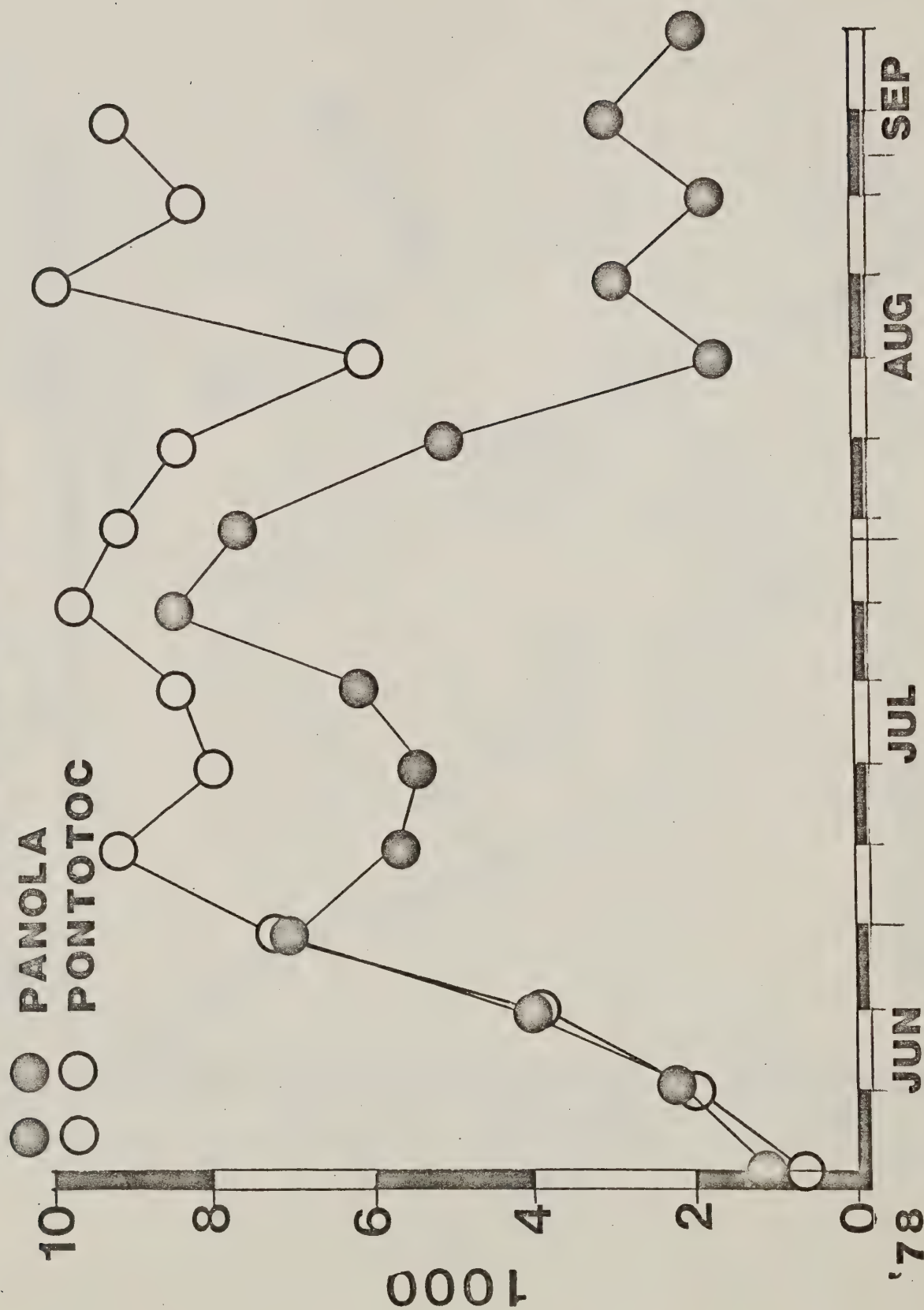


Fig. 29. - Most important beneficial arthropod populations per acre based on D-vac samples in Panola and Pontotoc Counties, 1978

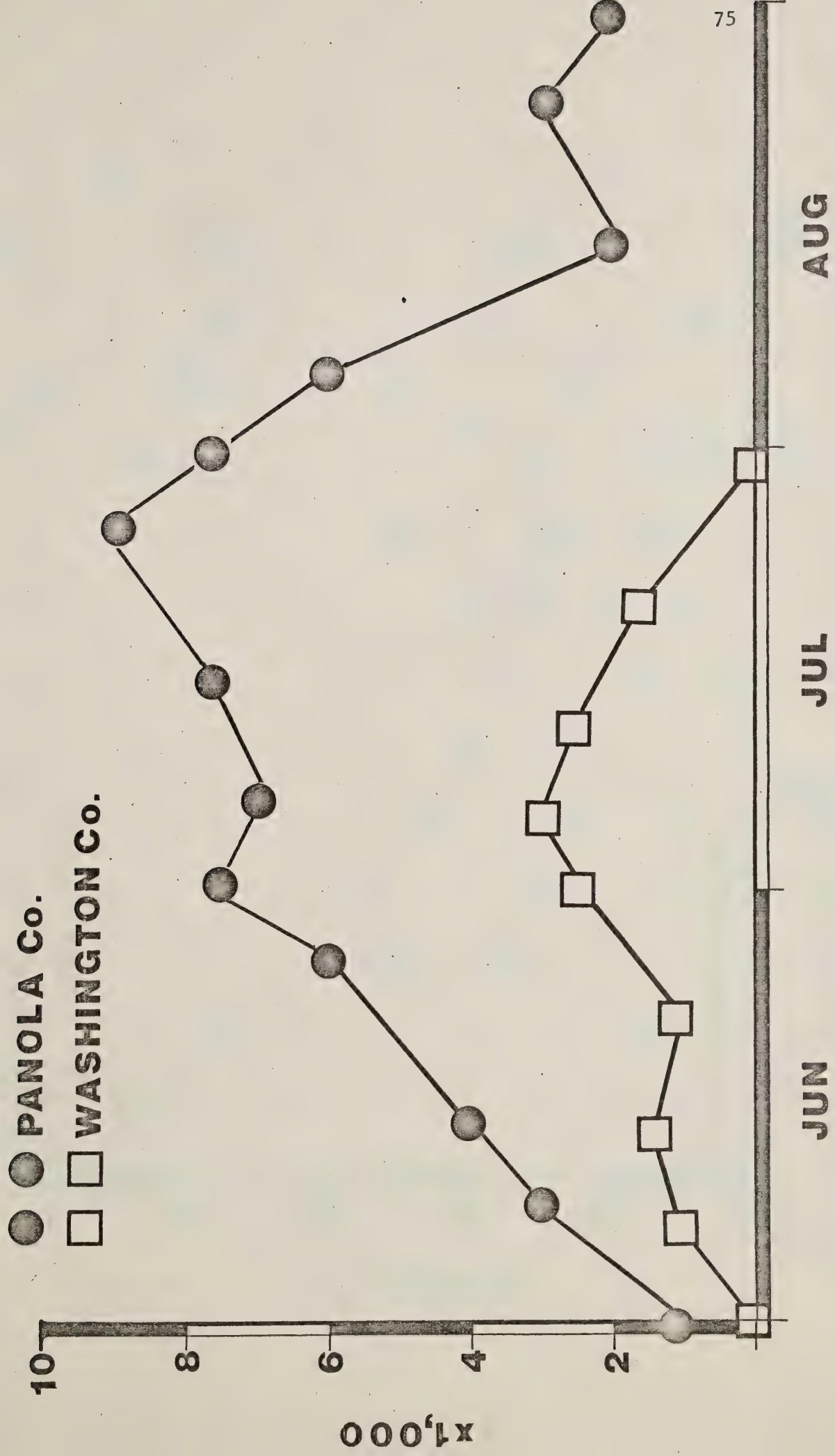


Fig. 30. - Important beneficial arthropod populations per acre based on D-vac samples in Panola and Washington Counties, 1978

Geocoris spp.

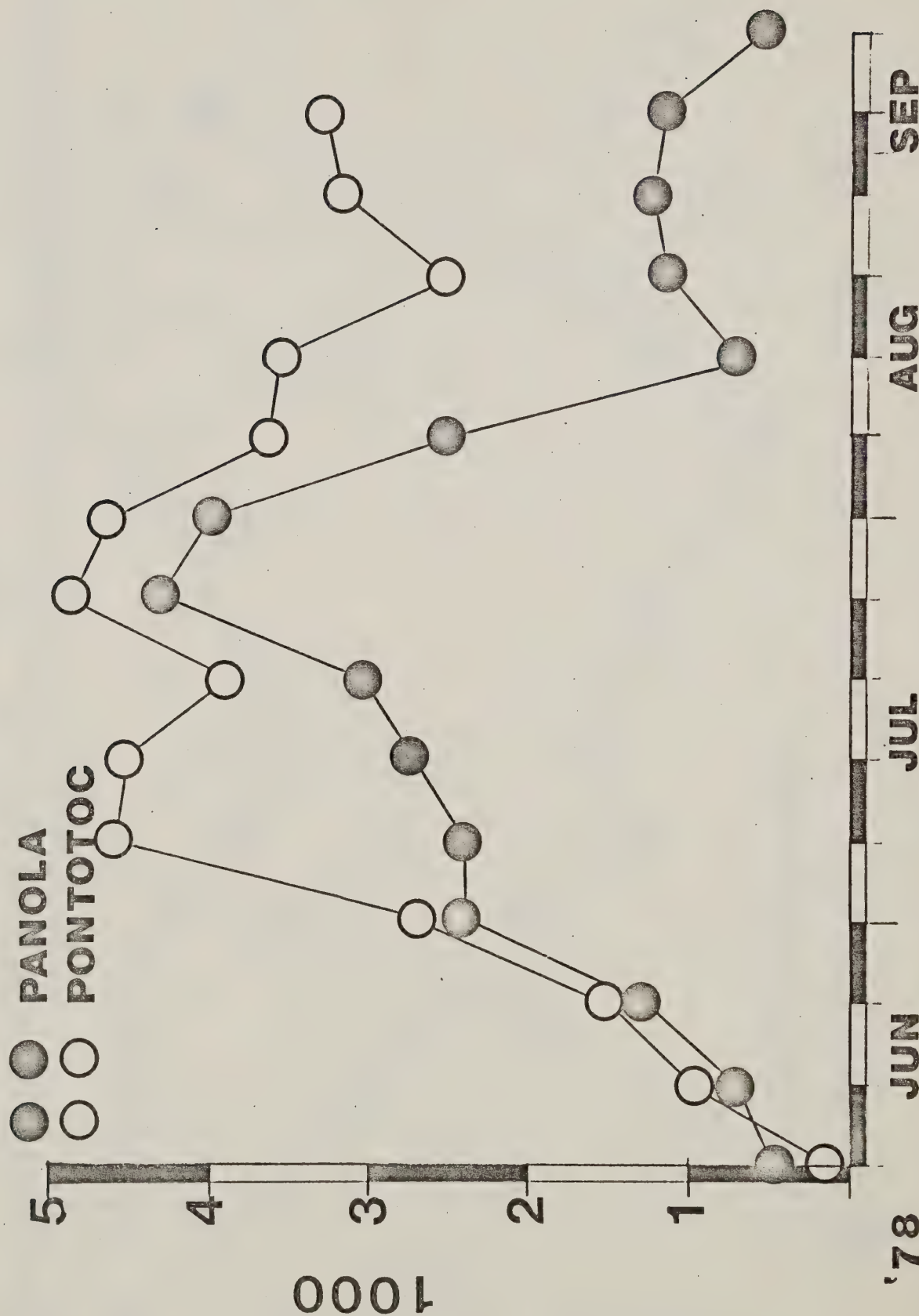


Fig. 31. - Populations of the big eyed bug per acre based on D-vac samples in Panola and Pontotoc Counties, 1978

Orius spp.

● PANOLA
○ PONTOTOC

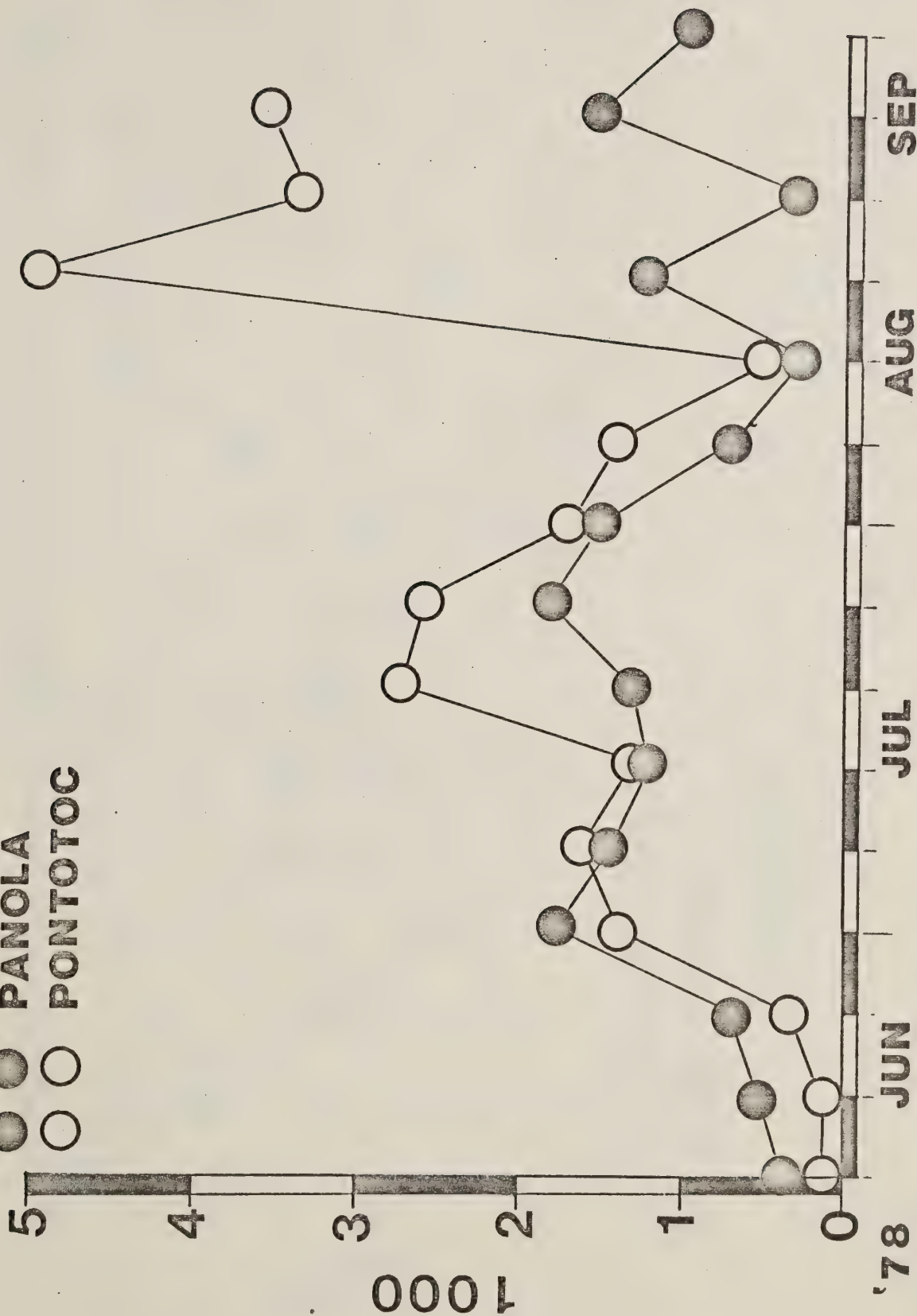
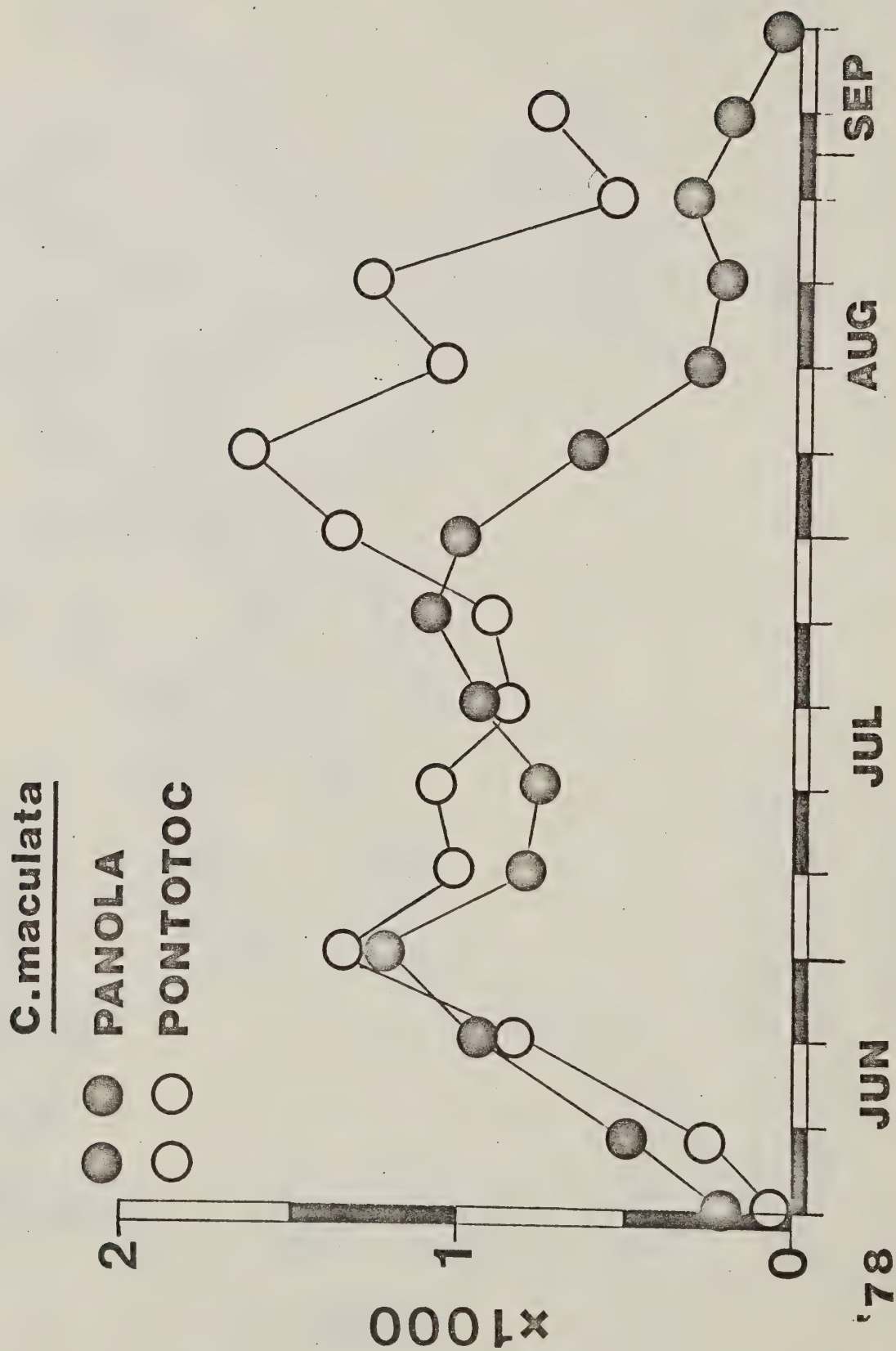


Fig. 32. - Populations of the flower bug per acre based on D-vac samples in Panola and Pontotoc Counties, 1978



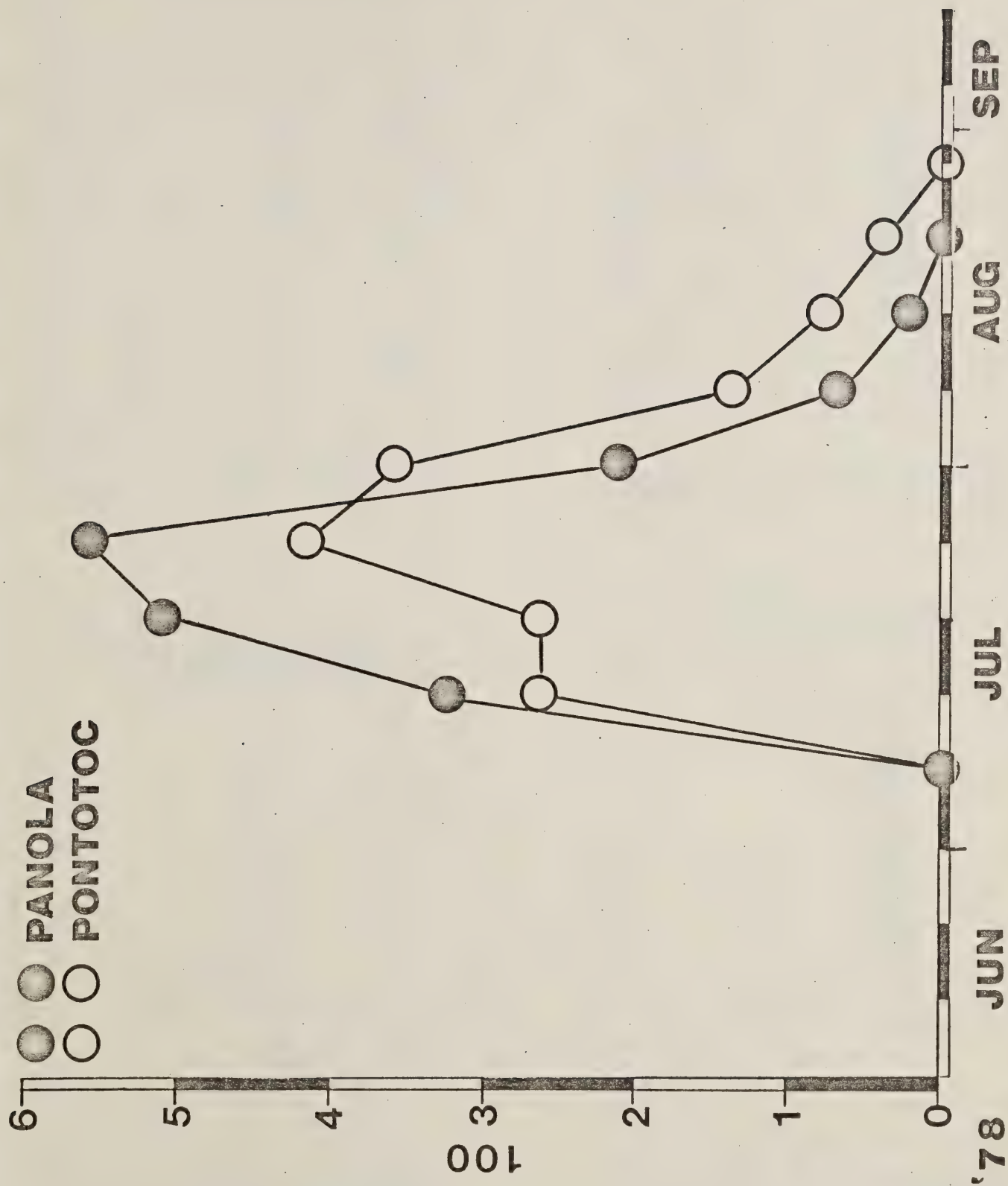


Fig. 34. - Populations of the tobacco wireworm, (click beetle) per acre based on D-vac samples in Panola and Pontotoc Counties in 1978

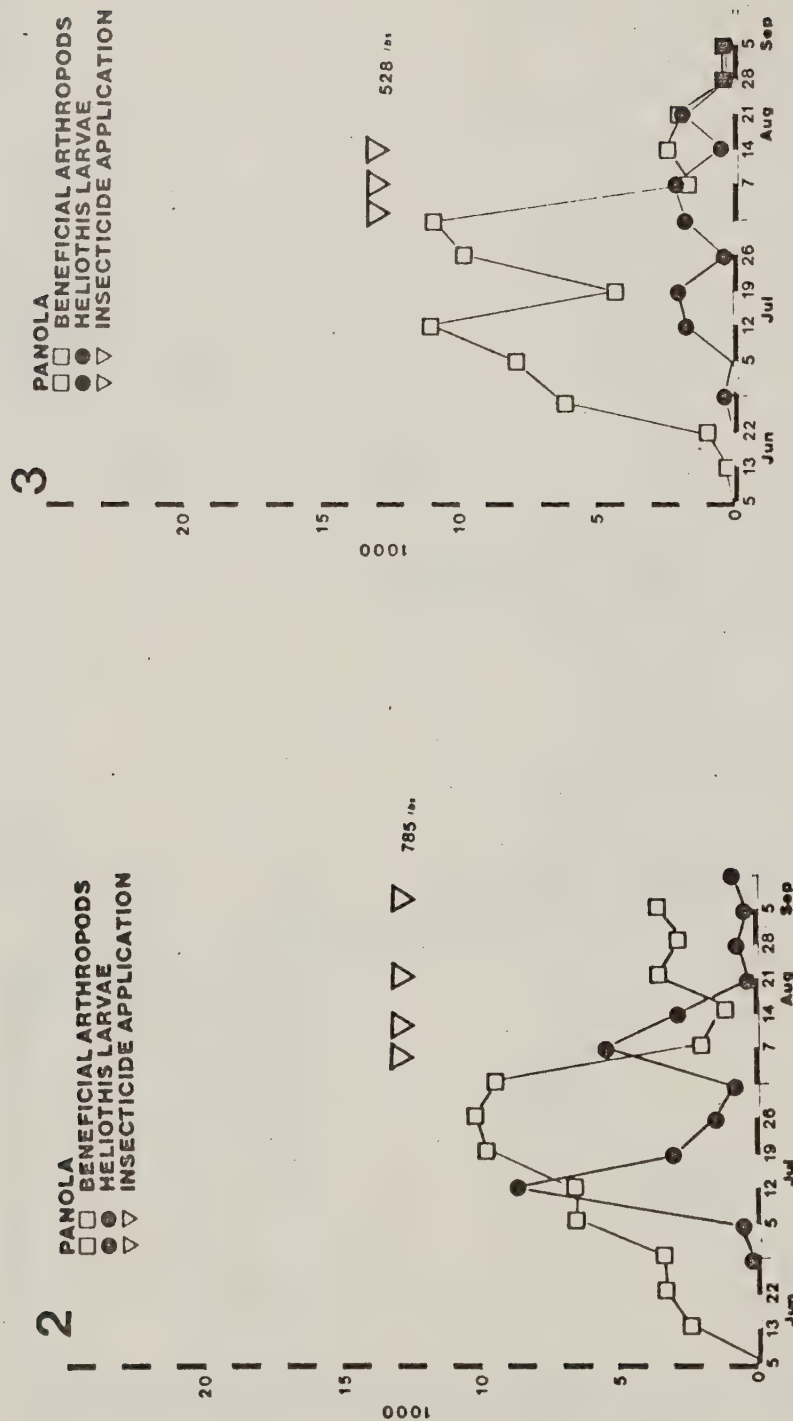
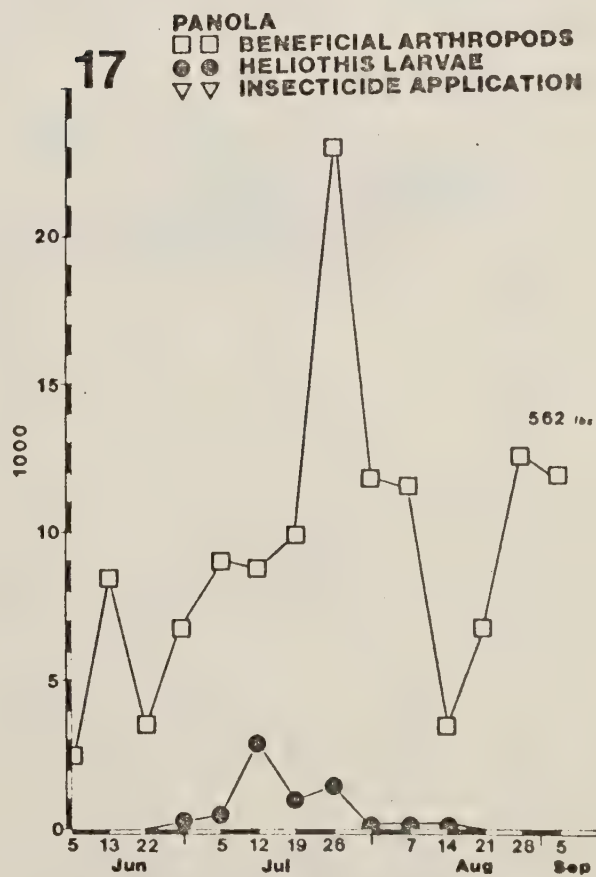
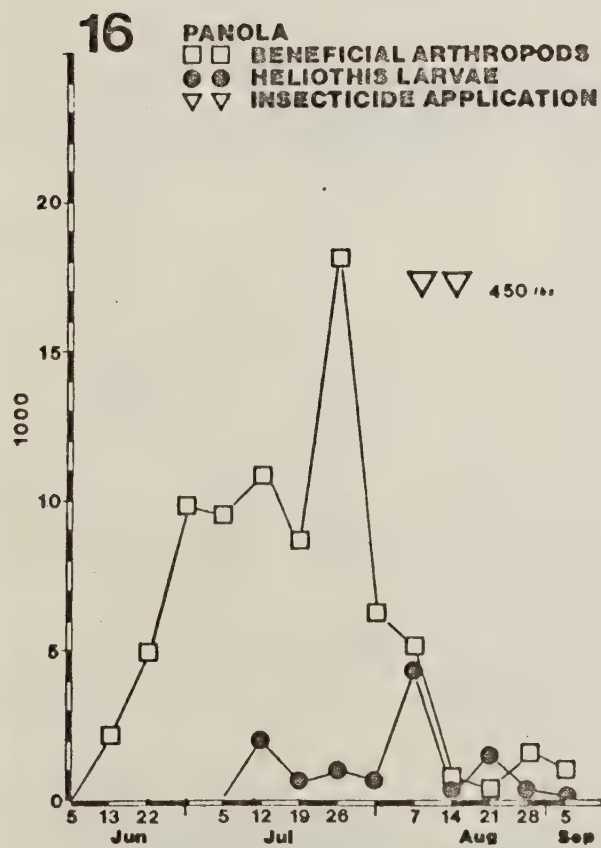
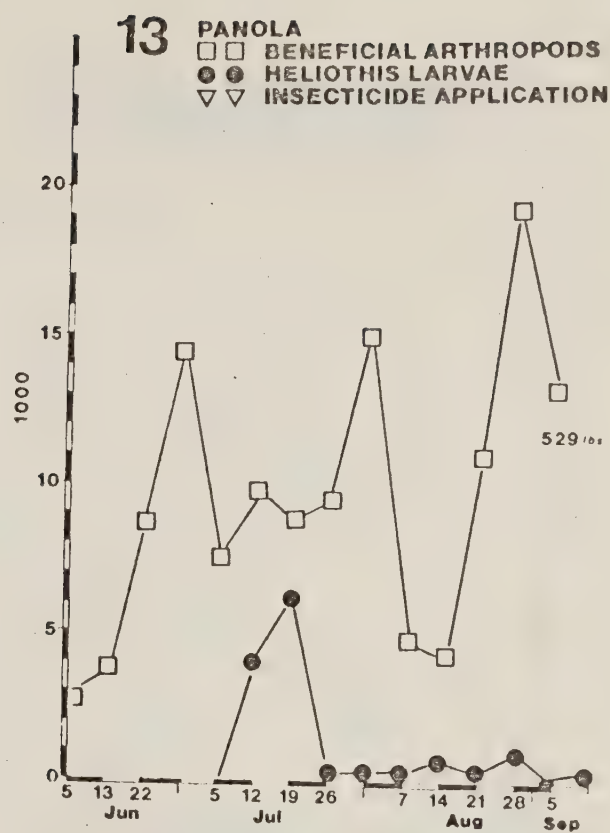
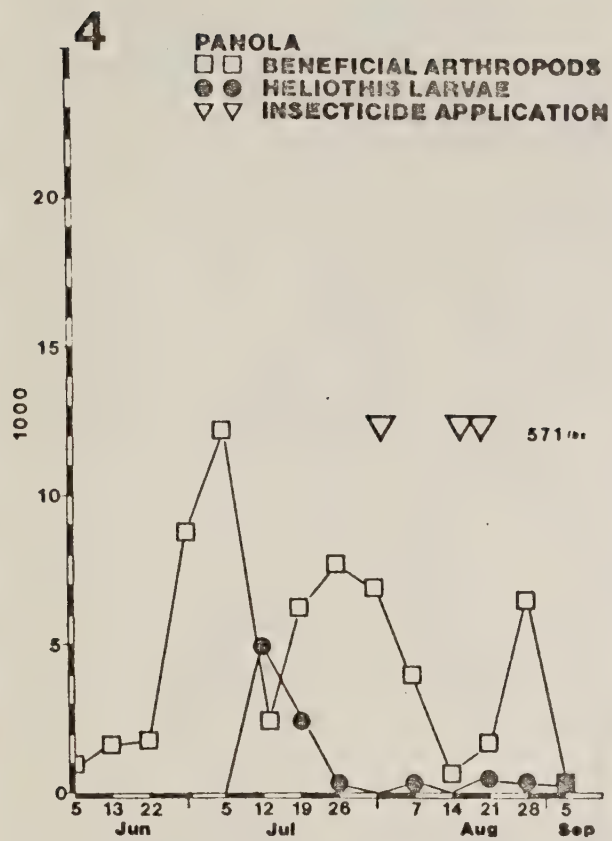


Fig. 35

Fig. 36

Figures 35 to 65 show comparative populations of beneficial arthropods and *Heliothis* spp. larvae, late-season applications of insecticides and yields in 20 and 10 intensively monitored fields in Panola and Pontotoc Counties, 1978.



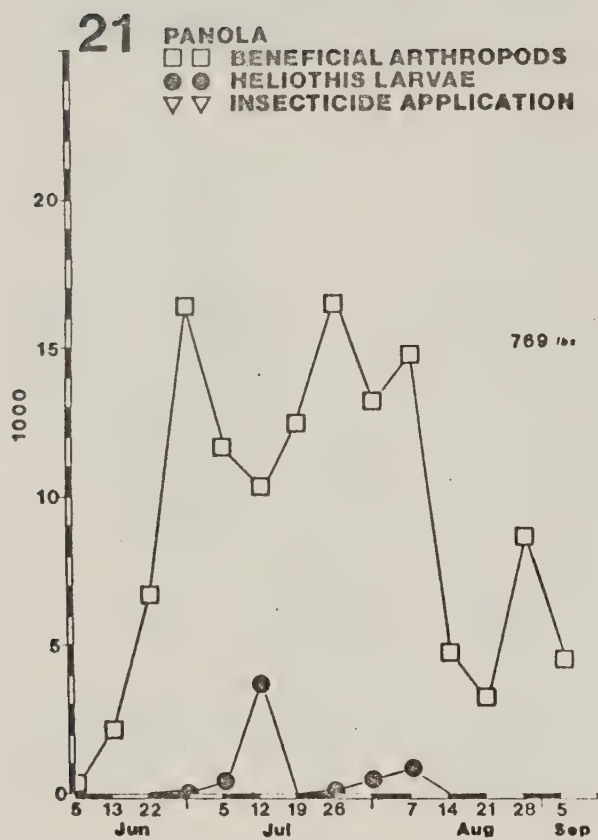


Fig. 41

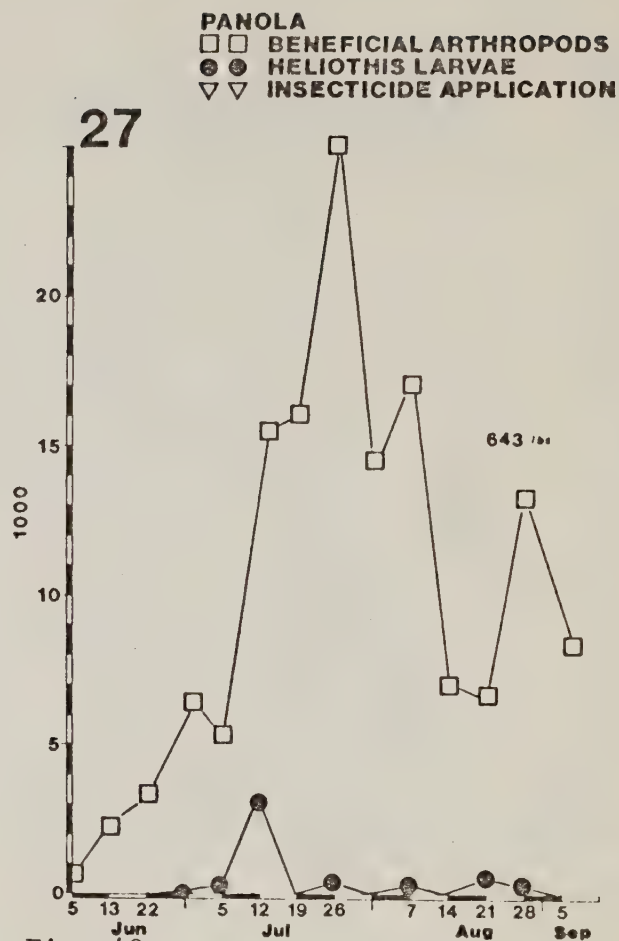


Fig. 42

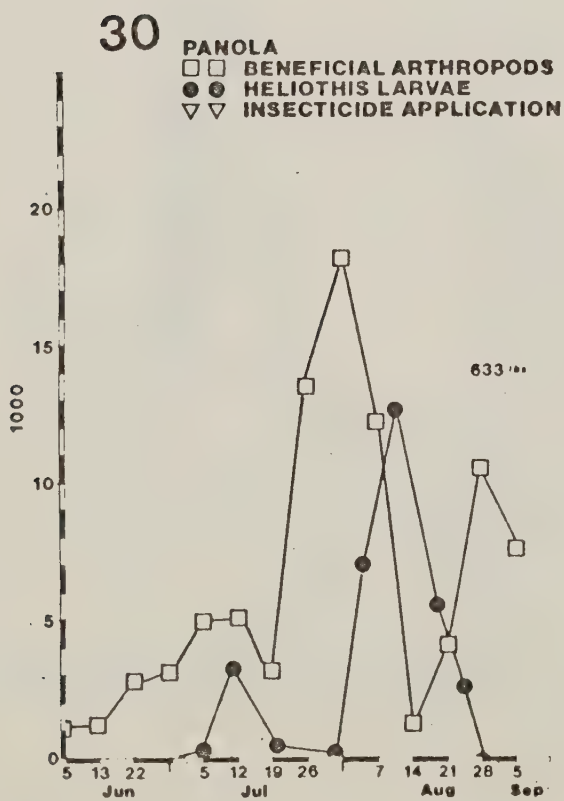


Fig. 43

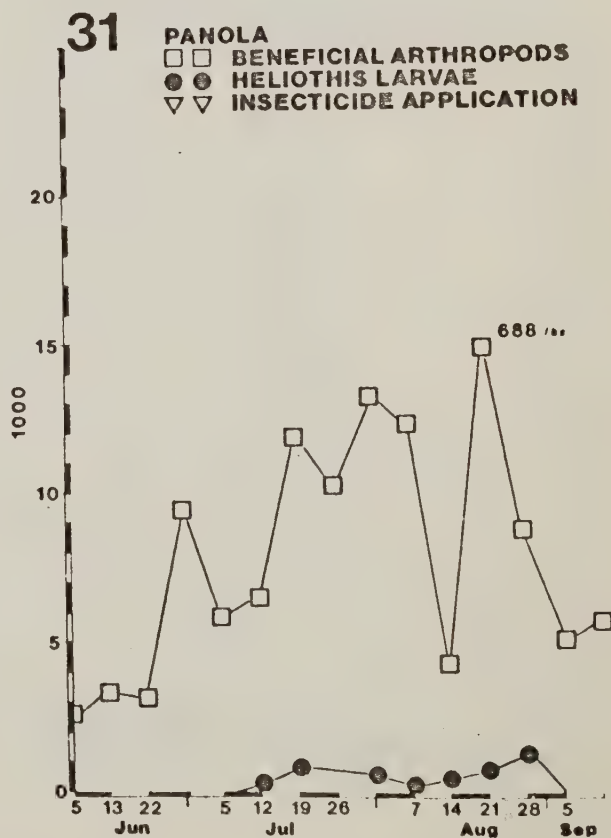


Fig. 44

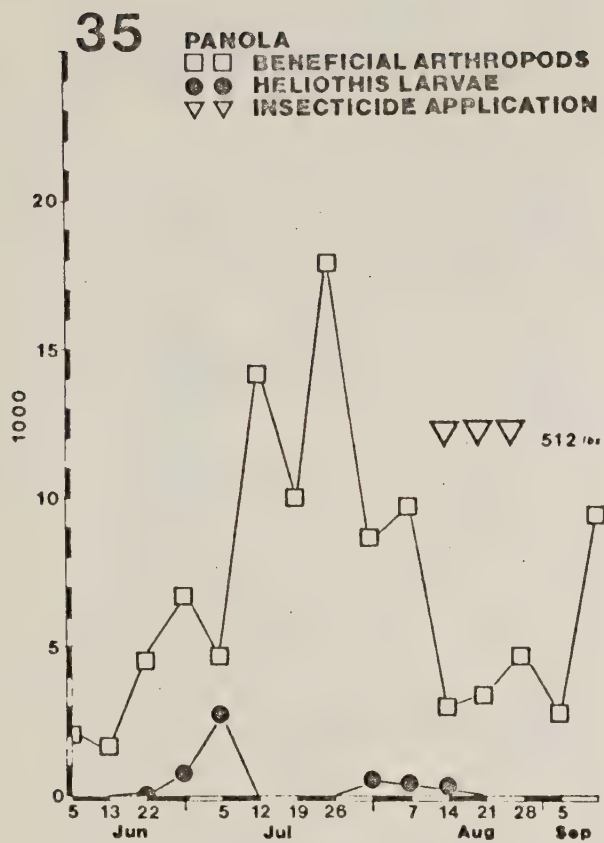


Fig. 45

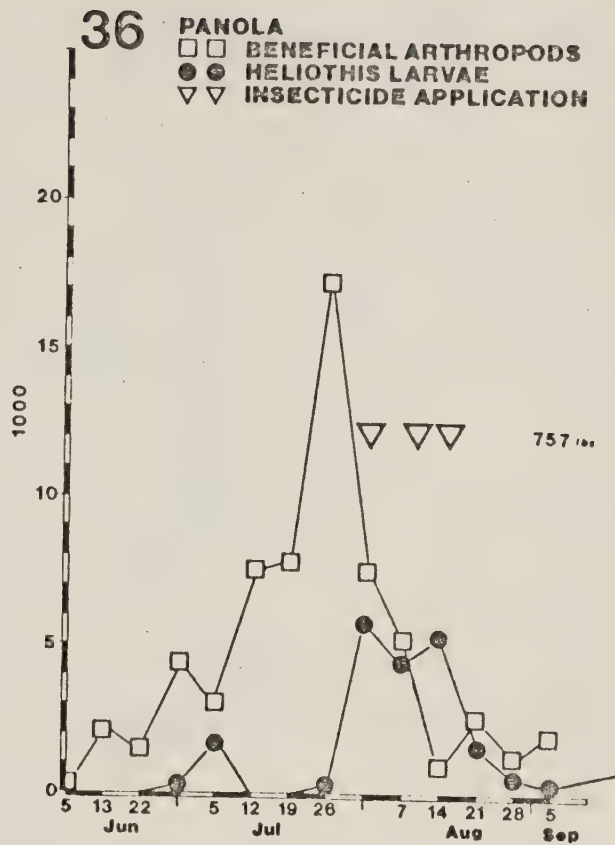


Fig. 46

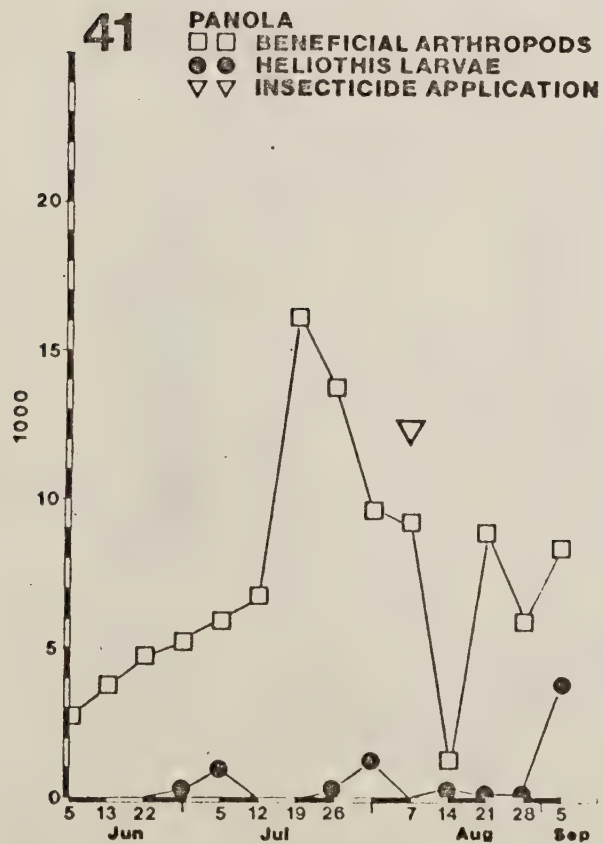


Fig. 47

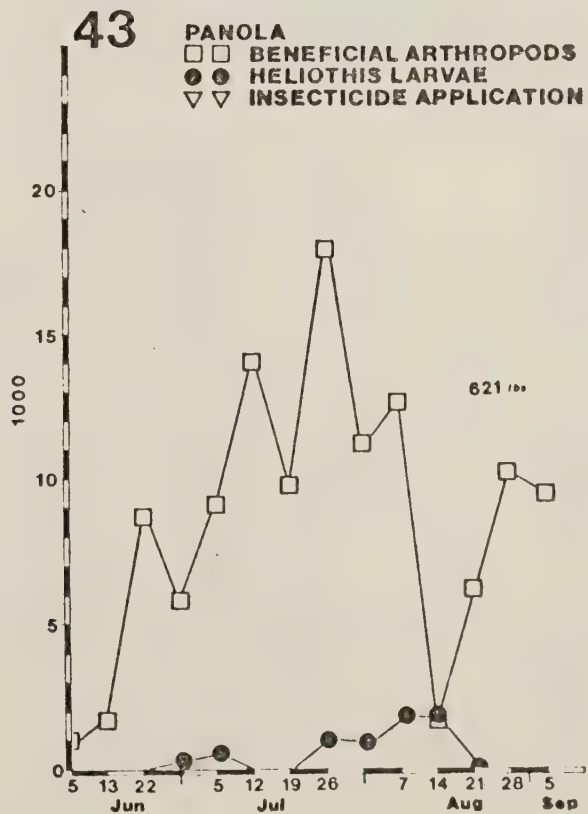


Fig. 48

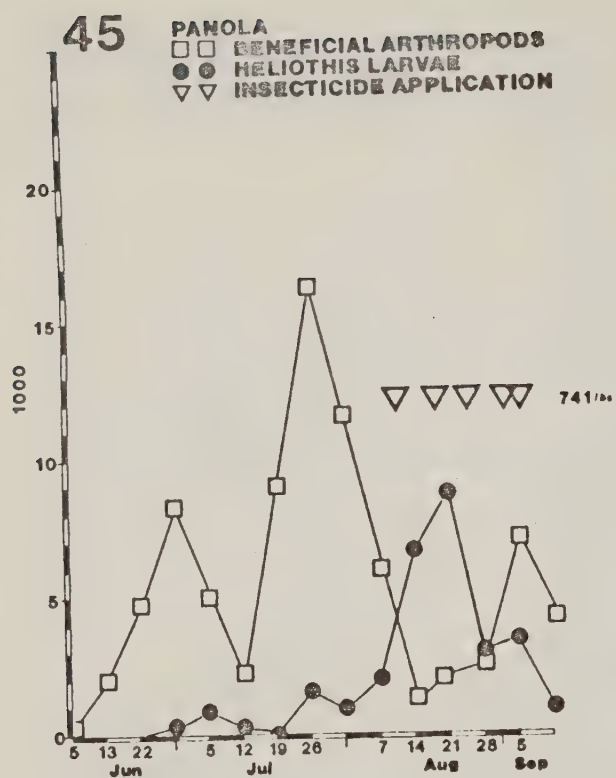


Fig. 49

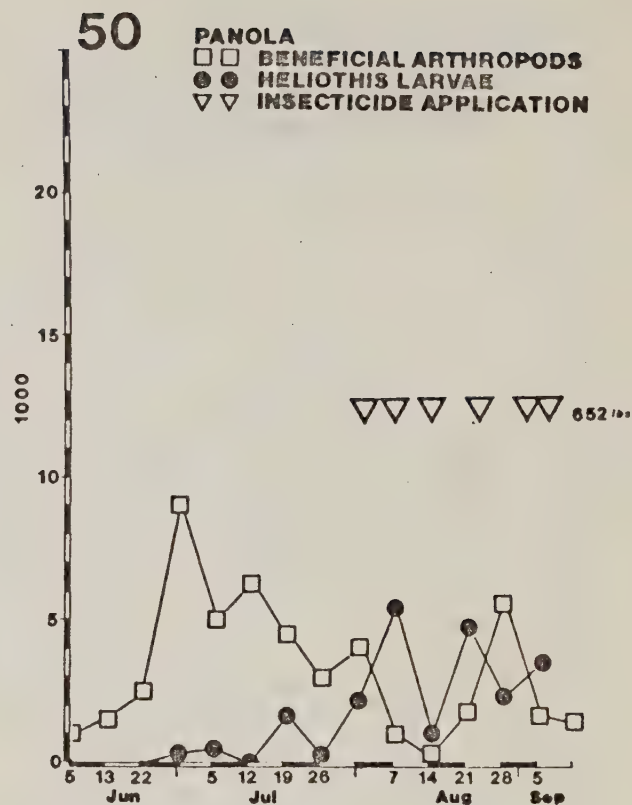


Fig. 50

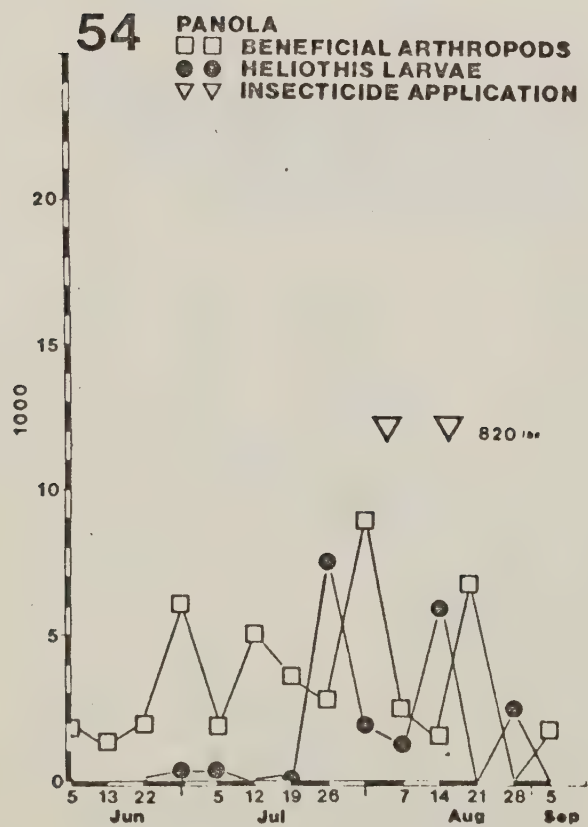


Fig. 51

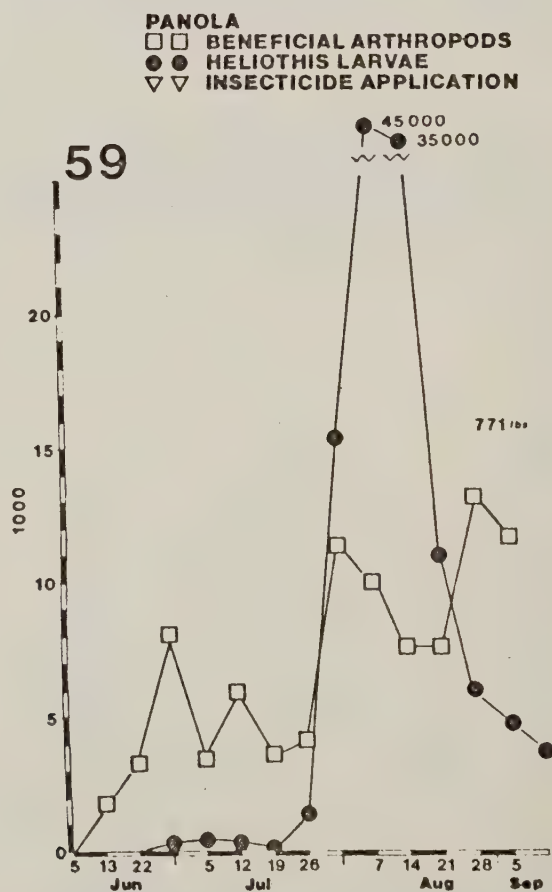


Fig. 52

61 PANOLA
□ BENEFICIAL ARTHROPODS
● HELIOTHIS LARVAE
▽ INSECTICIDE APPLICATION

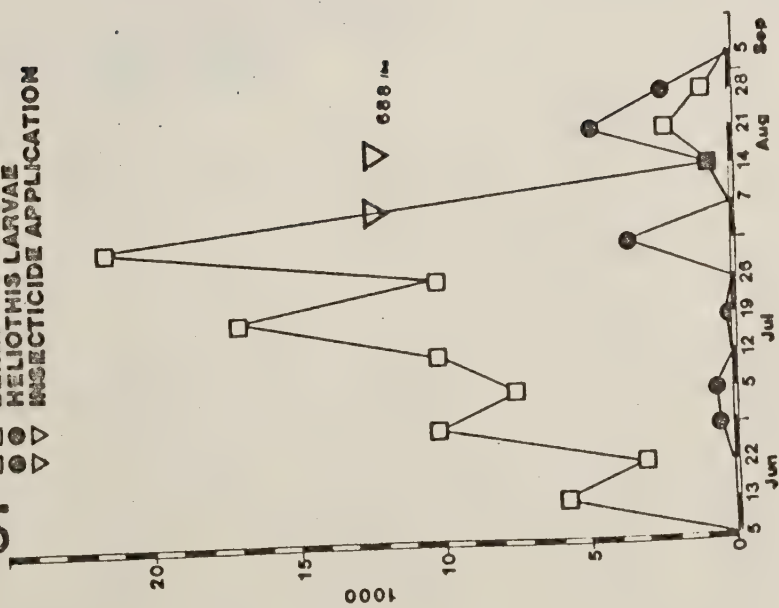


Fig. 53

63

PANOLA
□ BENEFICIAL ARTHROPODS
● HELIOTHIS LARVAE
▽ INSECTICIDE APPLICATION

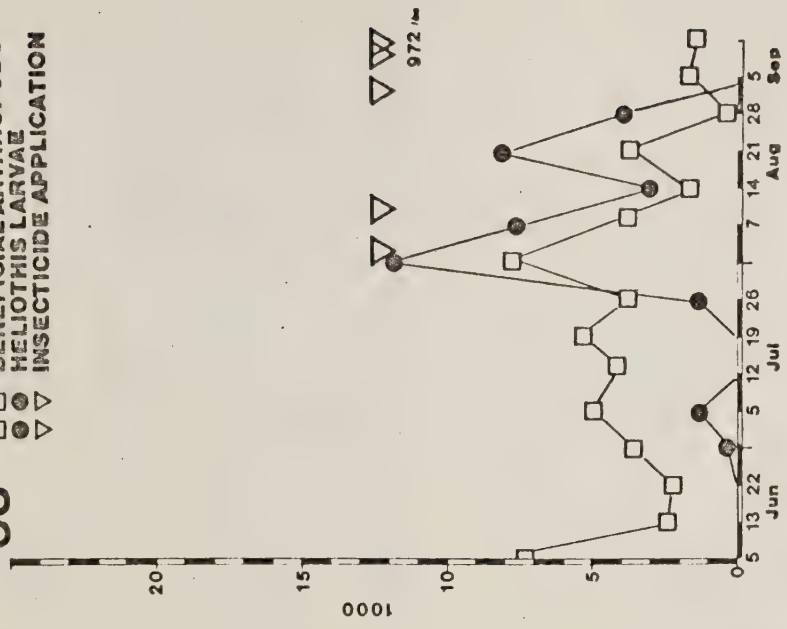


Fig. 54

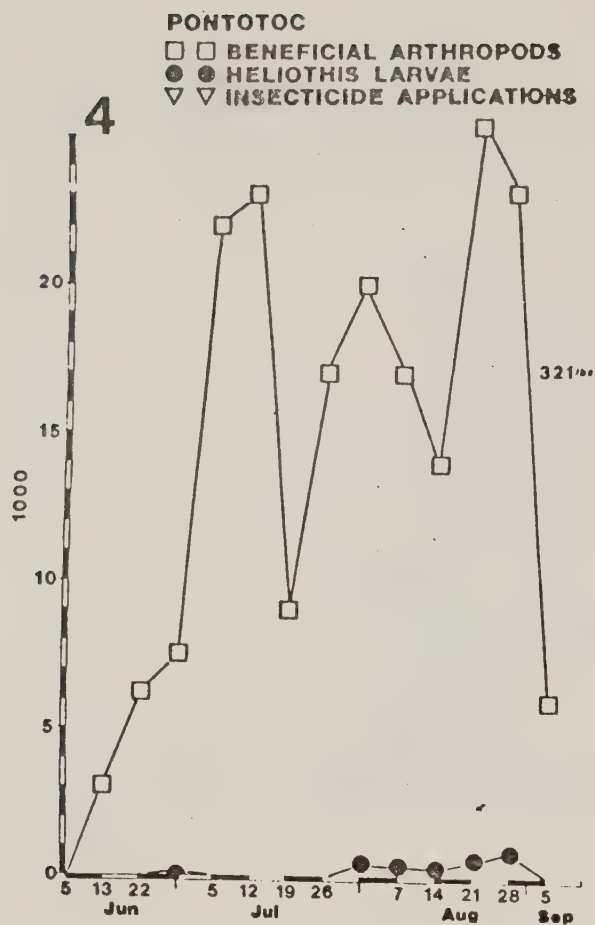


Fig. 55

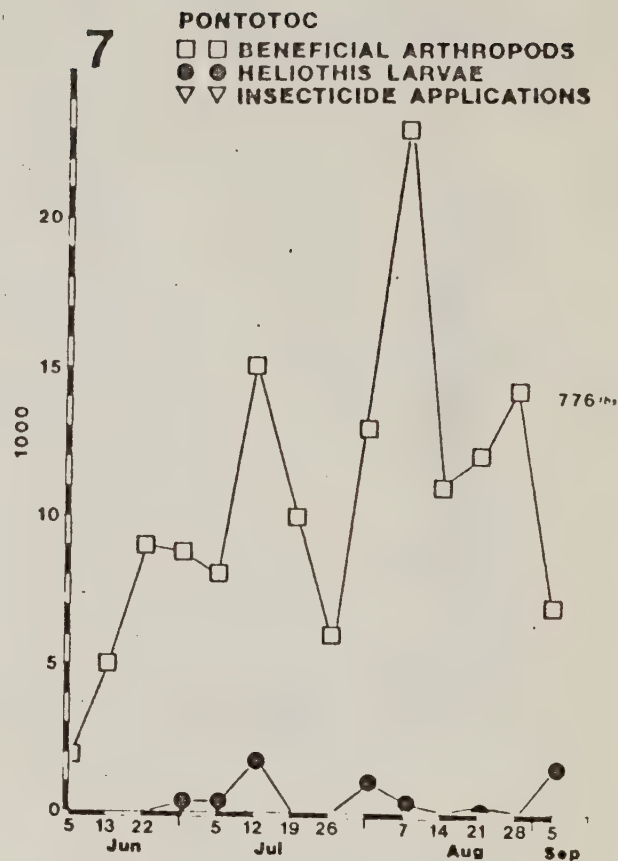


Fig. 56

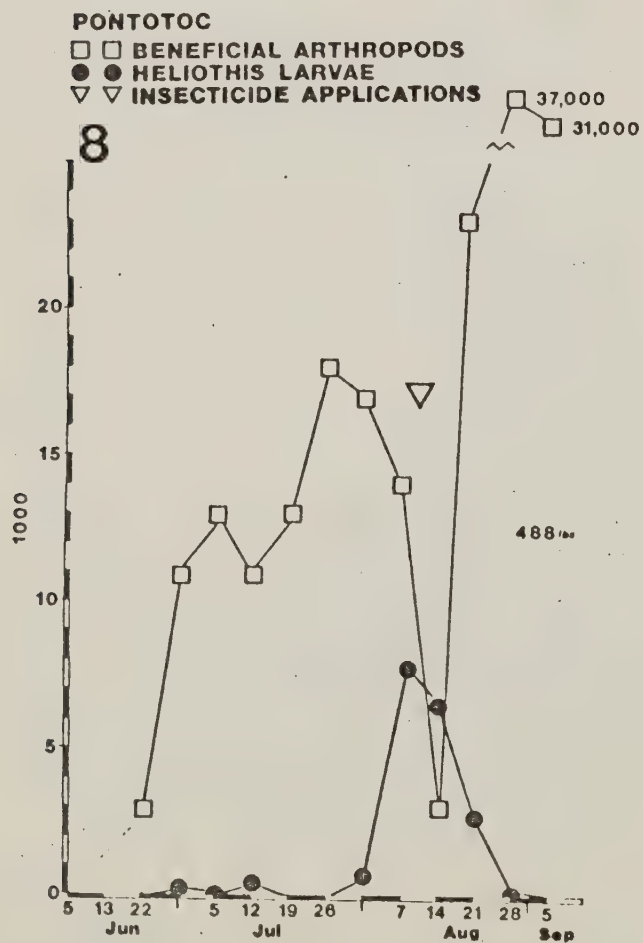


Fig. 57

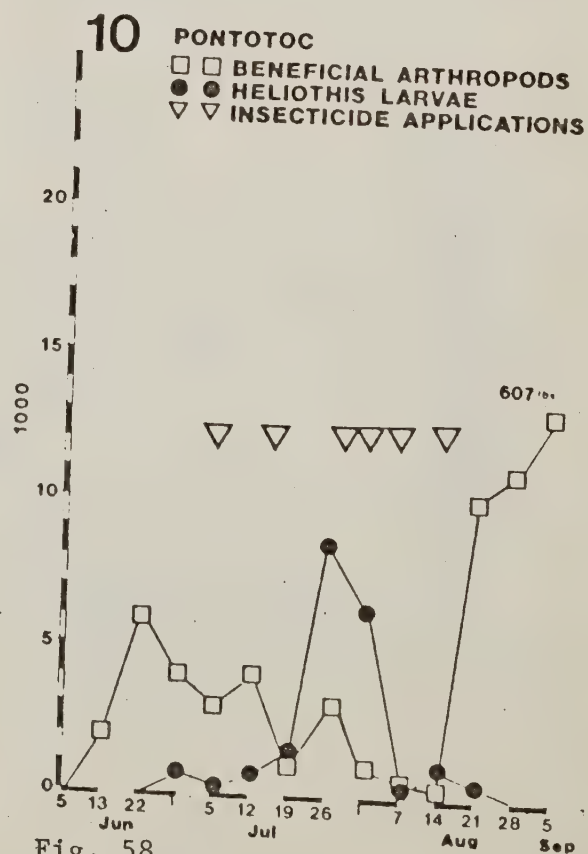


Fig. 58

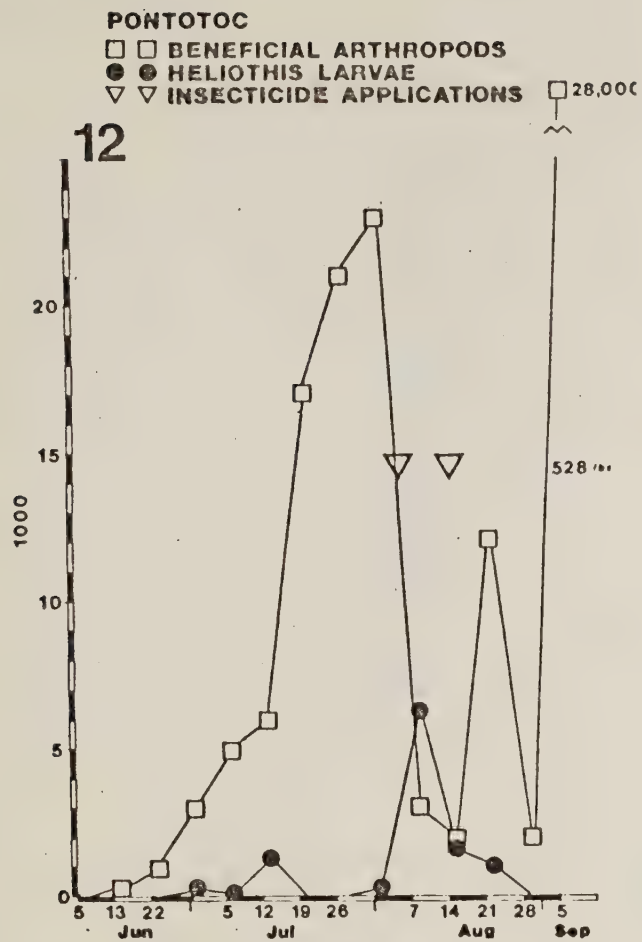


Fig. 59

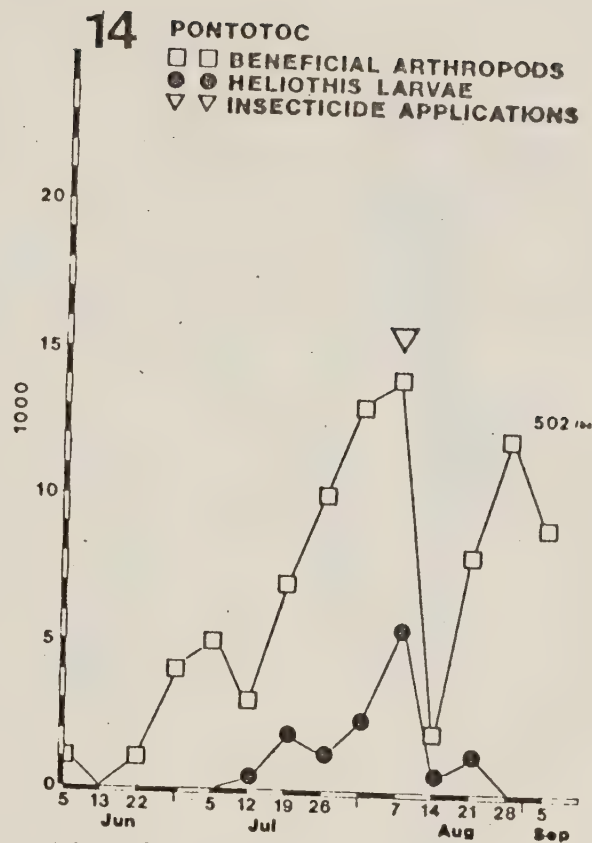


Fig. 60

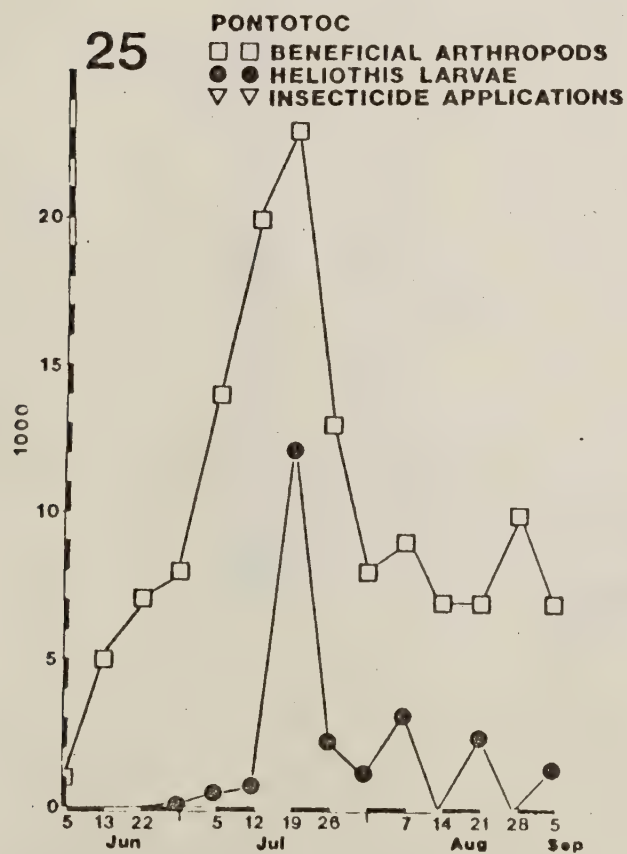


Fig. 61

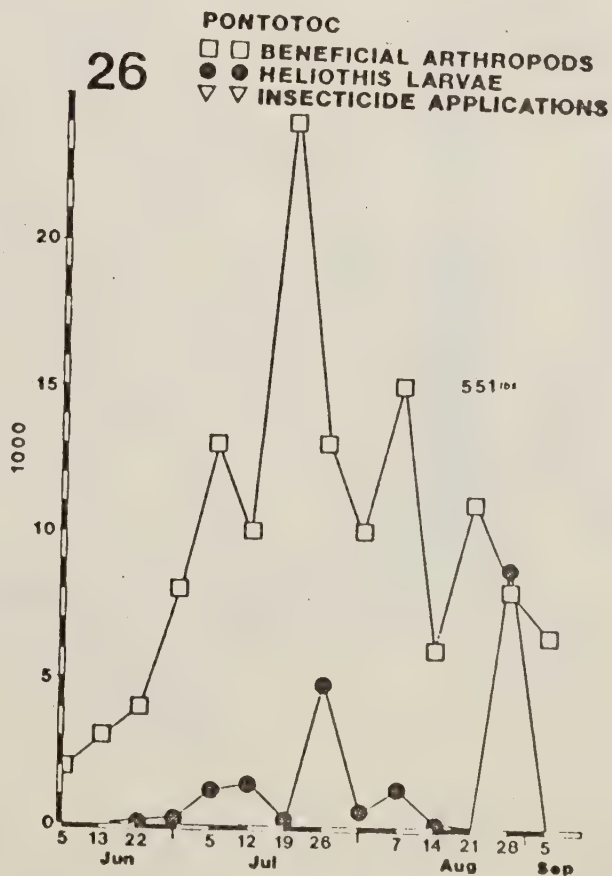


Fig. 62

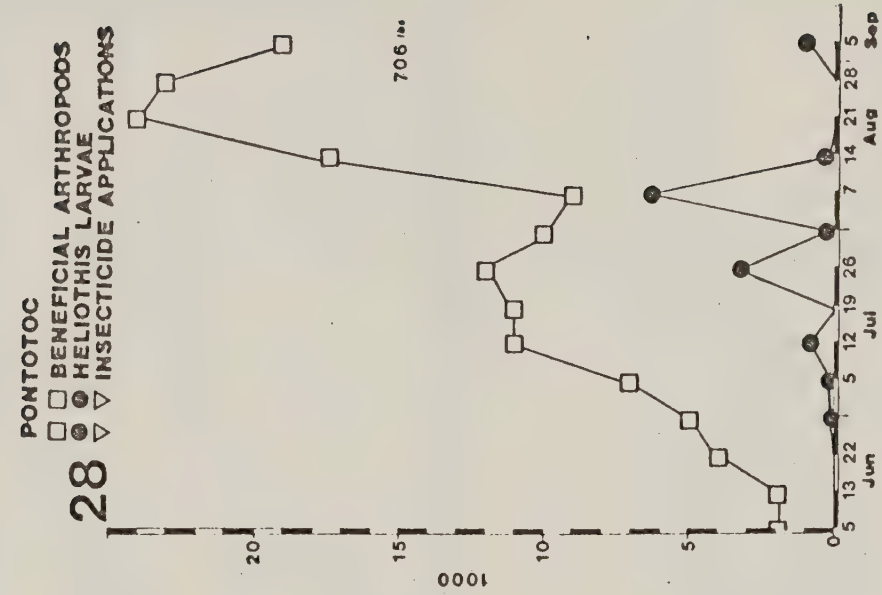


Fig. 64

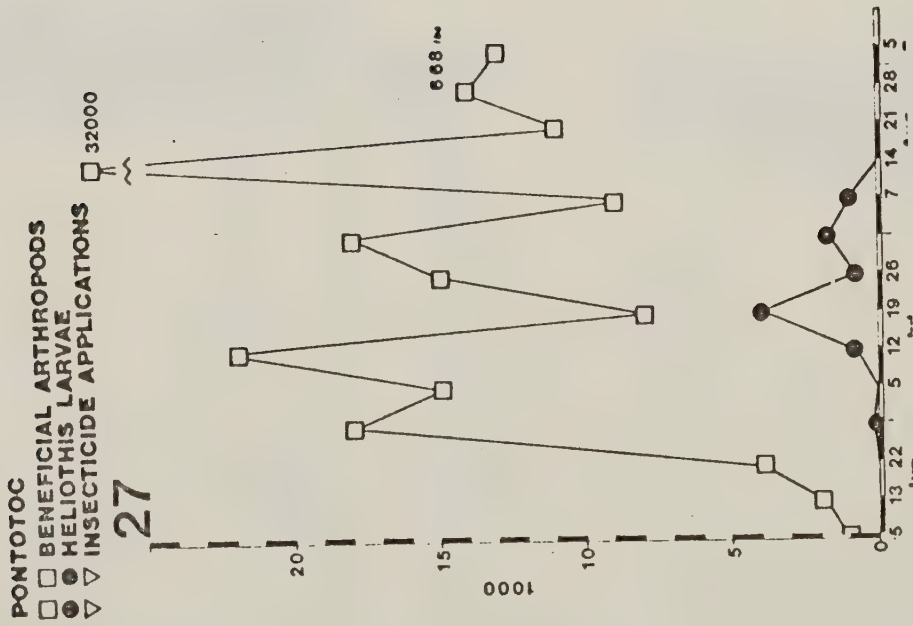


Fig. 63

Hunting Spiders, Panola

□ 77

○ 78

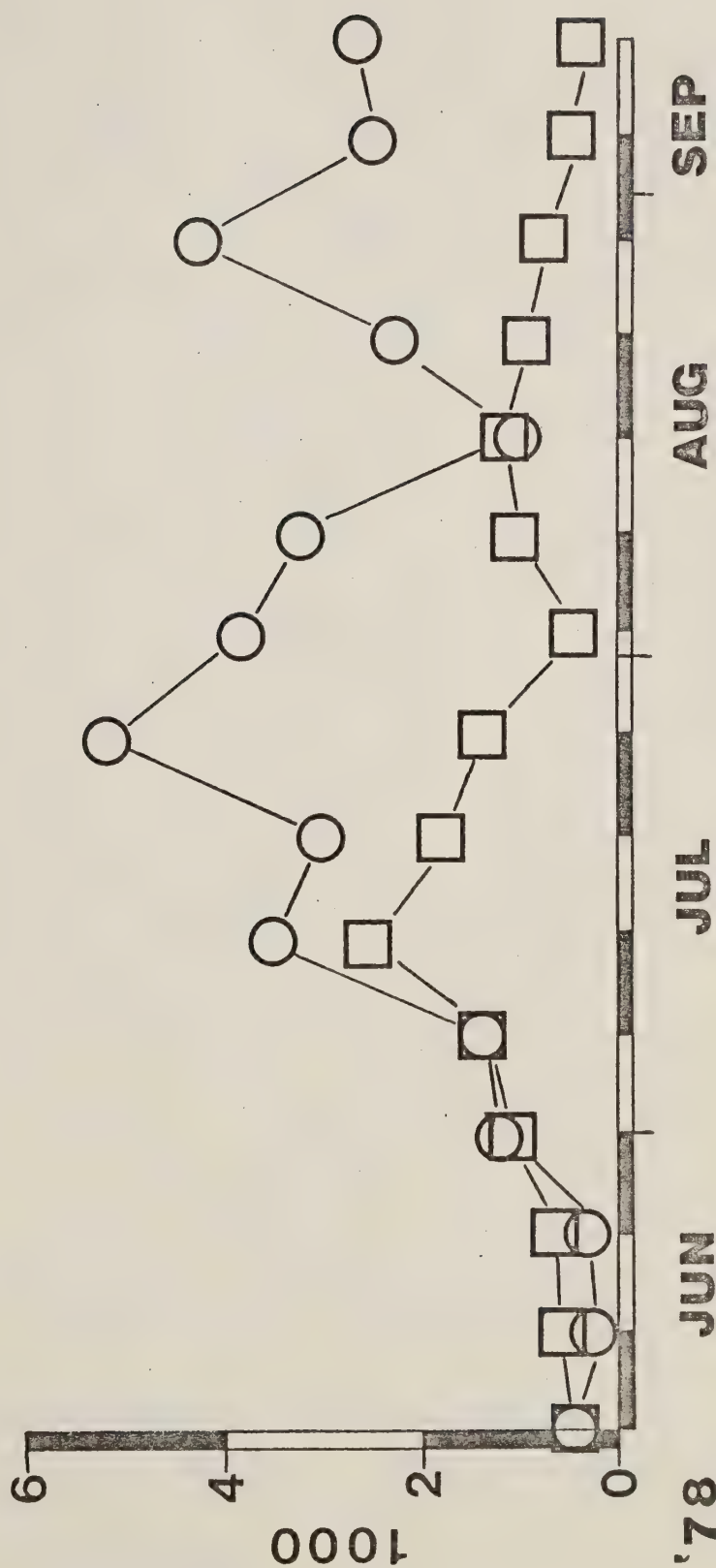


Fig. 65. - Populations of hunting spiders per acre based on D-vac samples in Panola County in 1977 and 1978

Hunting Spiders, Pontotoc

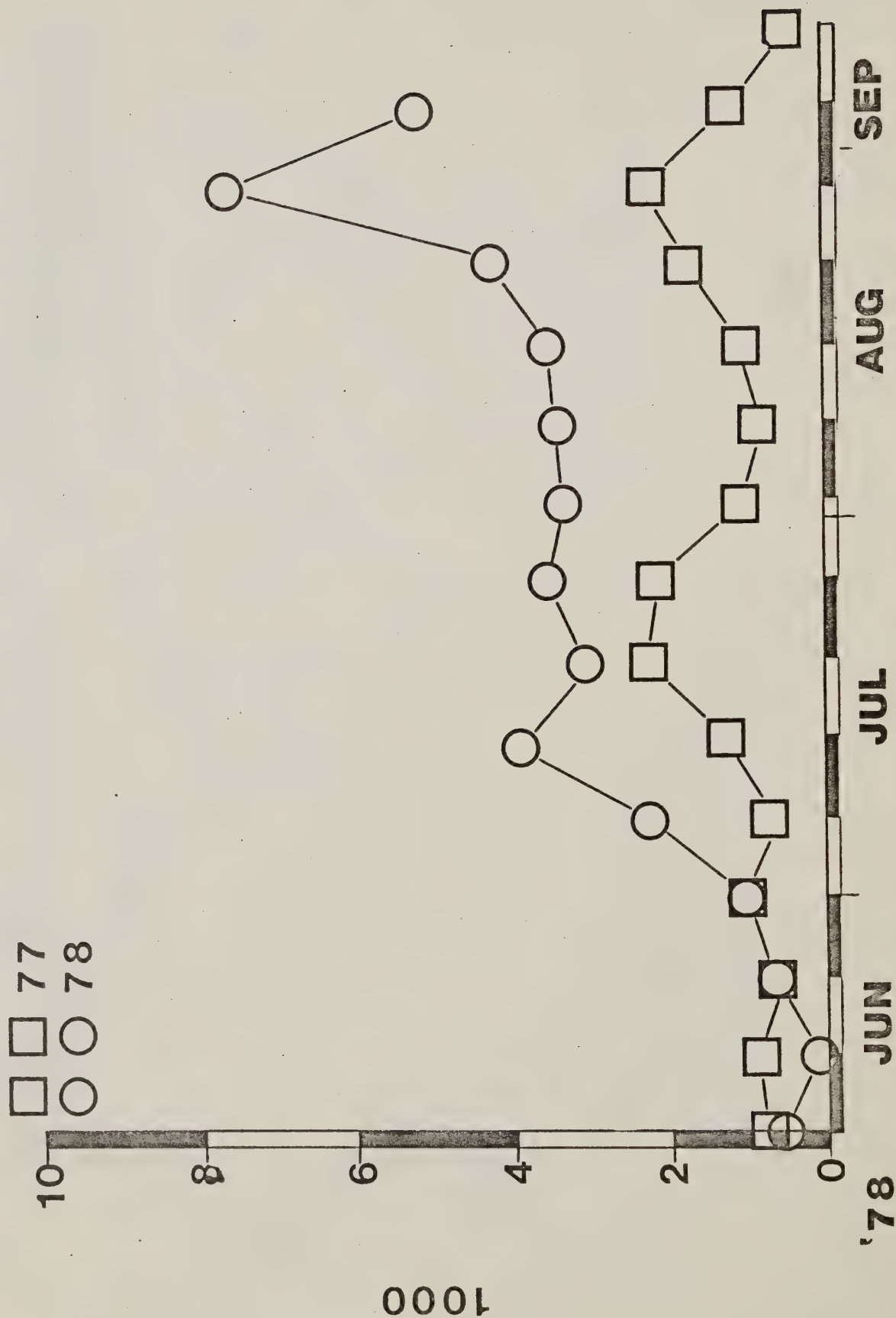


Fig. 66. - Populations of hunting spiders per acre based on D-vac samples in Pontotoc County in 1977 and 1978

HUNTING SPIDERS

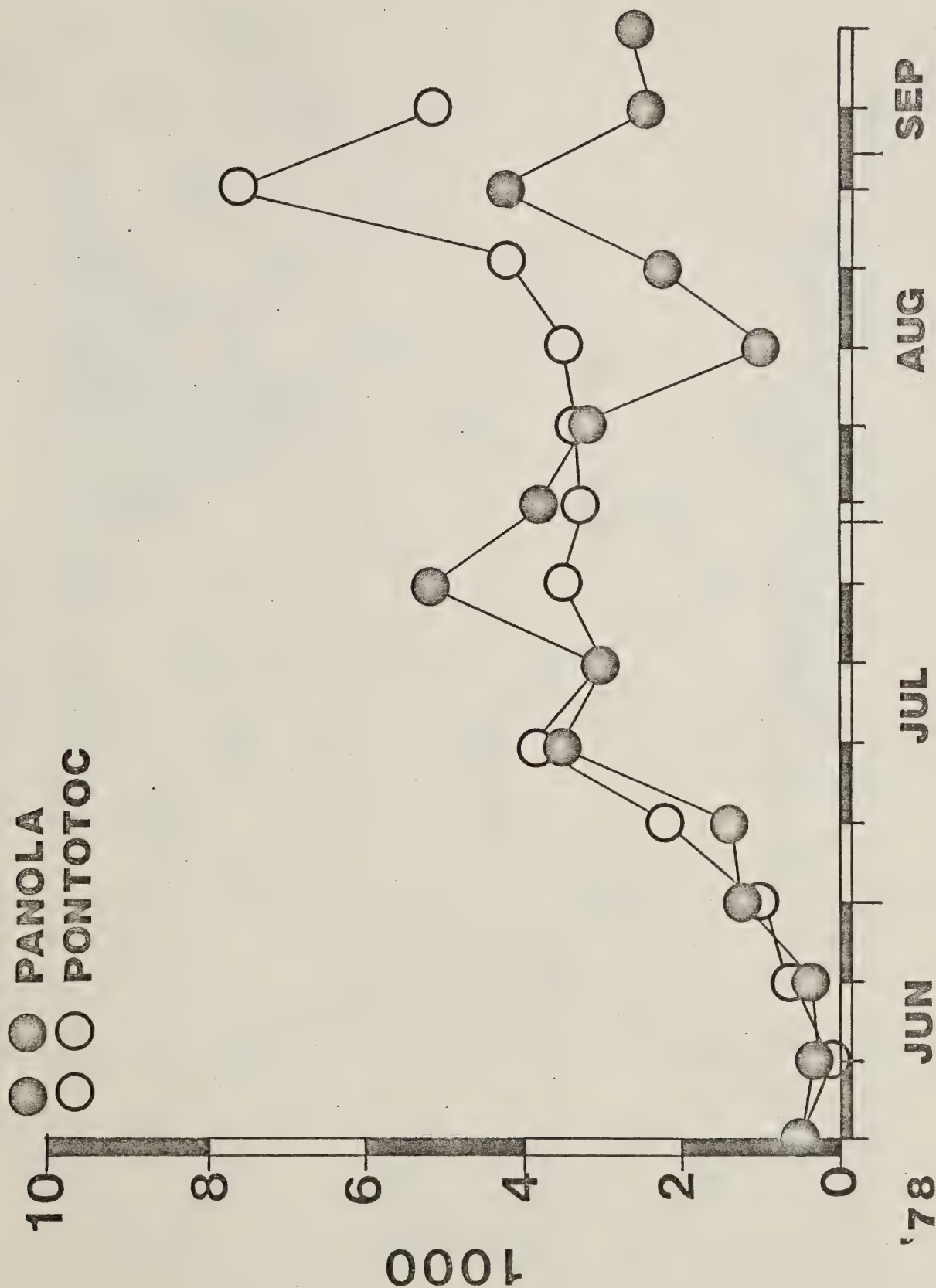
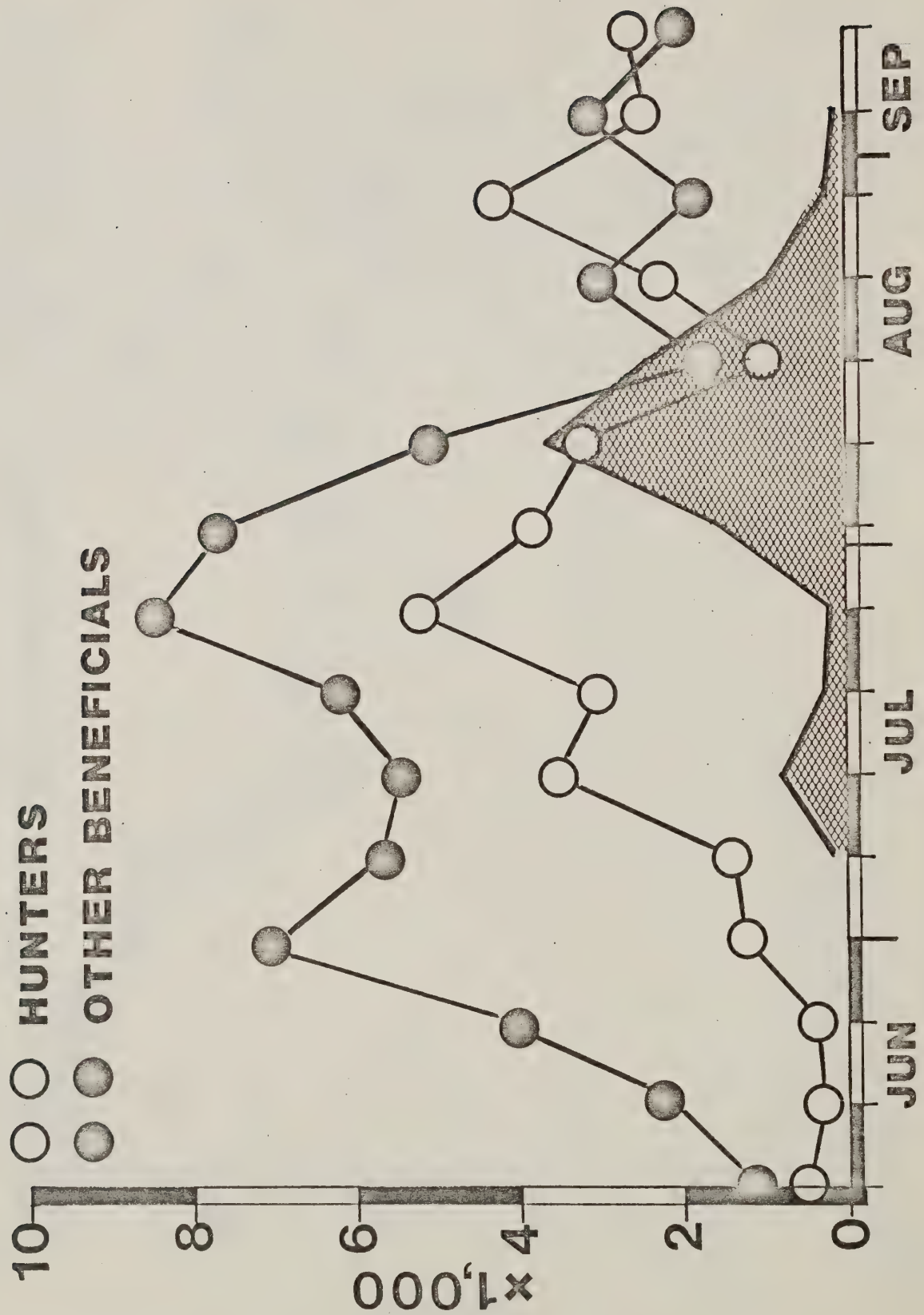


Fig. 67. - Populations of hunting spiders per acre based on D-vac samples in Panola and Pontotoc Counties, 1978



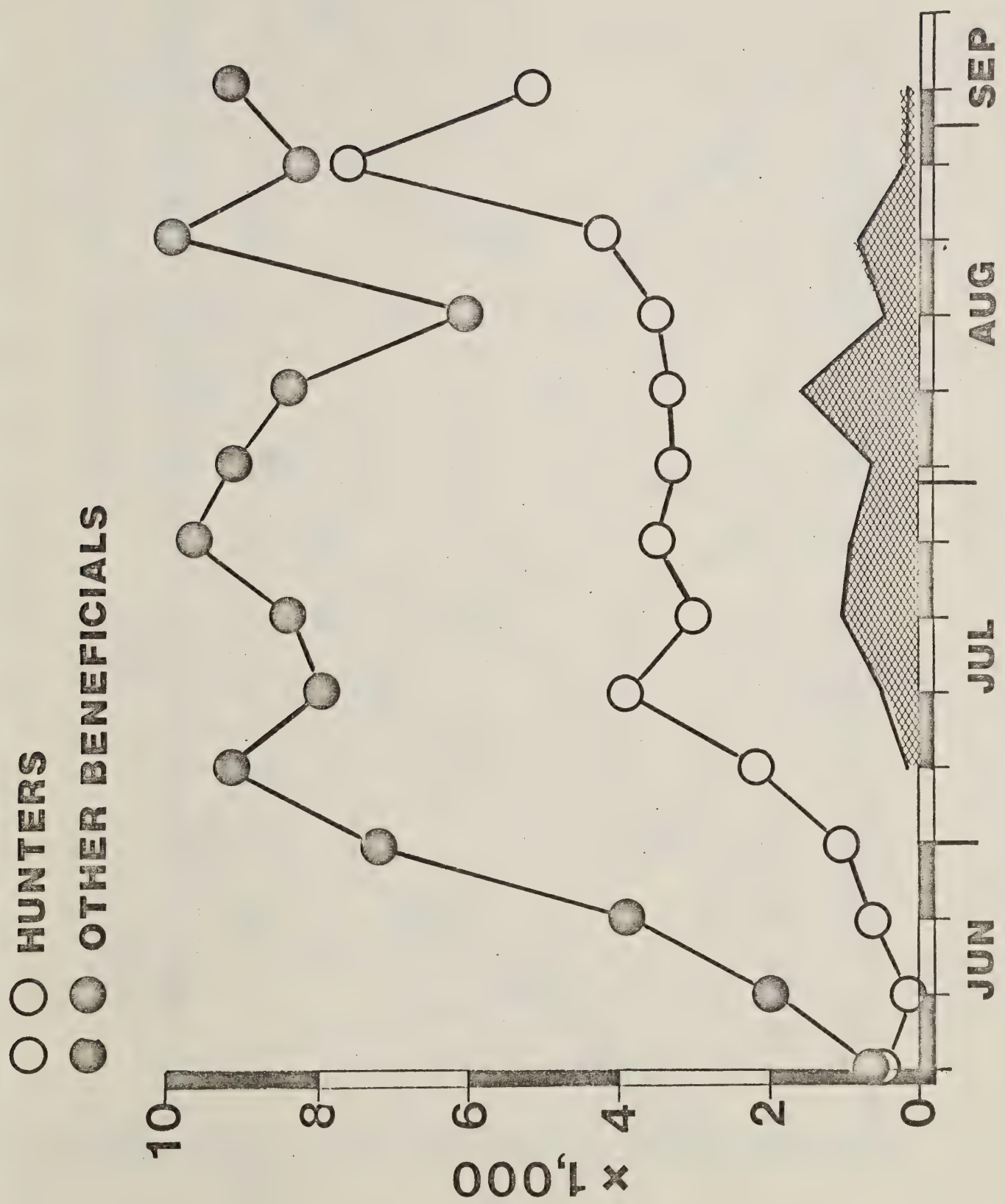


Fig. 69. - Hunter spider and other beneficial arthropod populations based on D-vac samples and Heliothis spp. larval populations in Pontotoc County in 1978

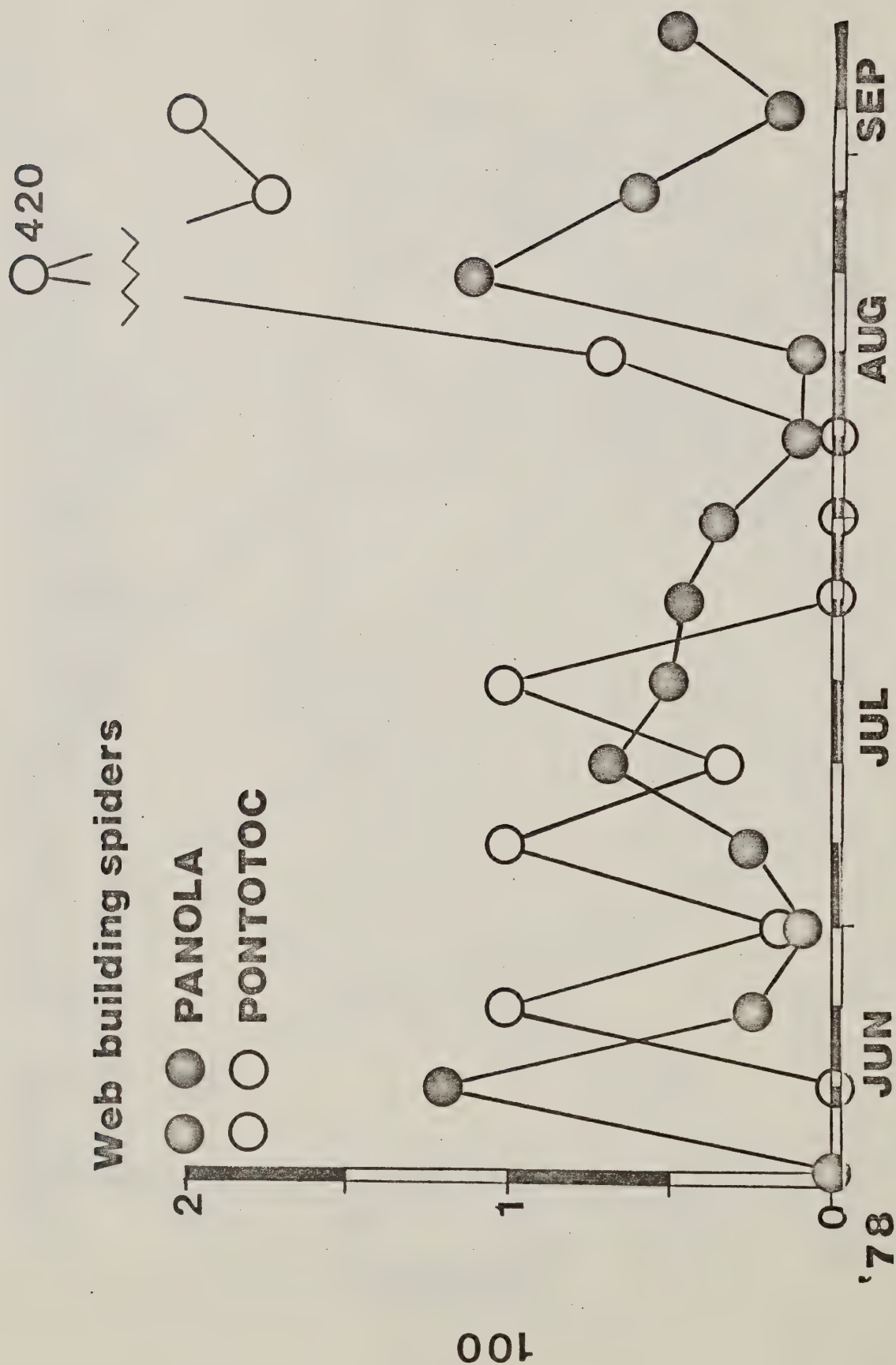


Fig. 70. - Populations of web building spiders per acre based on D-vac samples in Panola and Pontotoc Counties in 1978

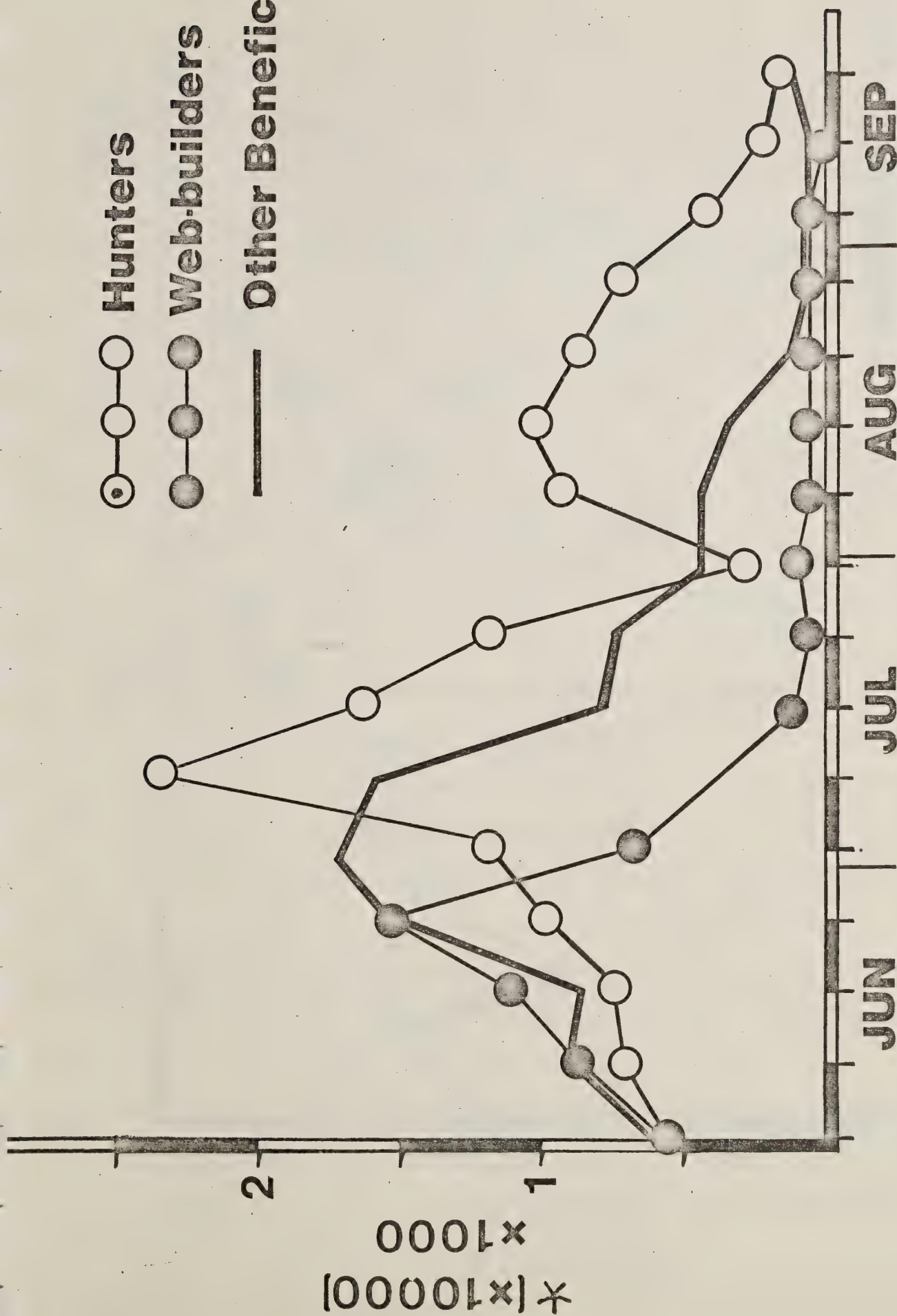


Fig. 71. - Populations of hunter and web-building spiders and other beneficial arthropods per acre based on D-vac samples in Panola County, 1977.

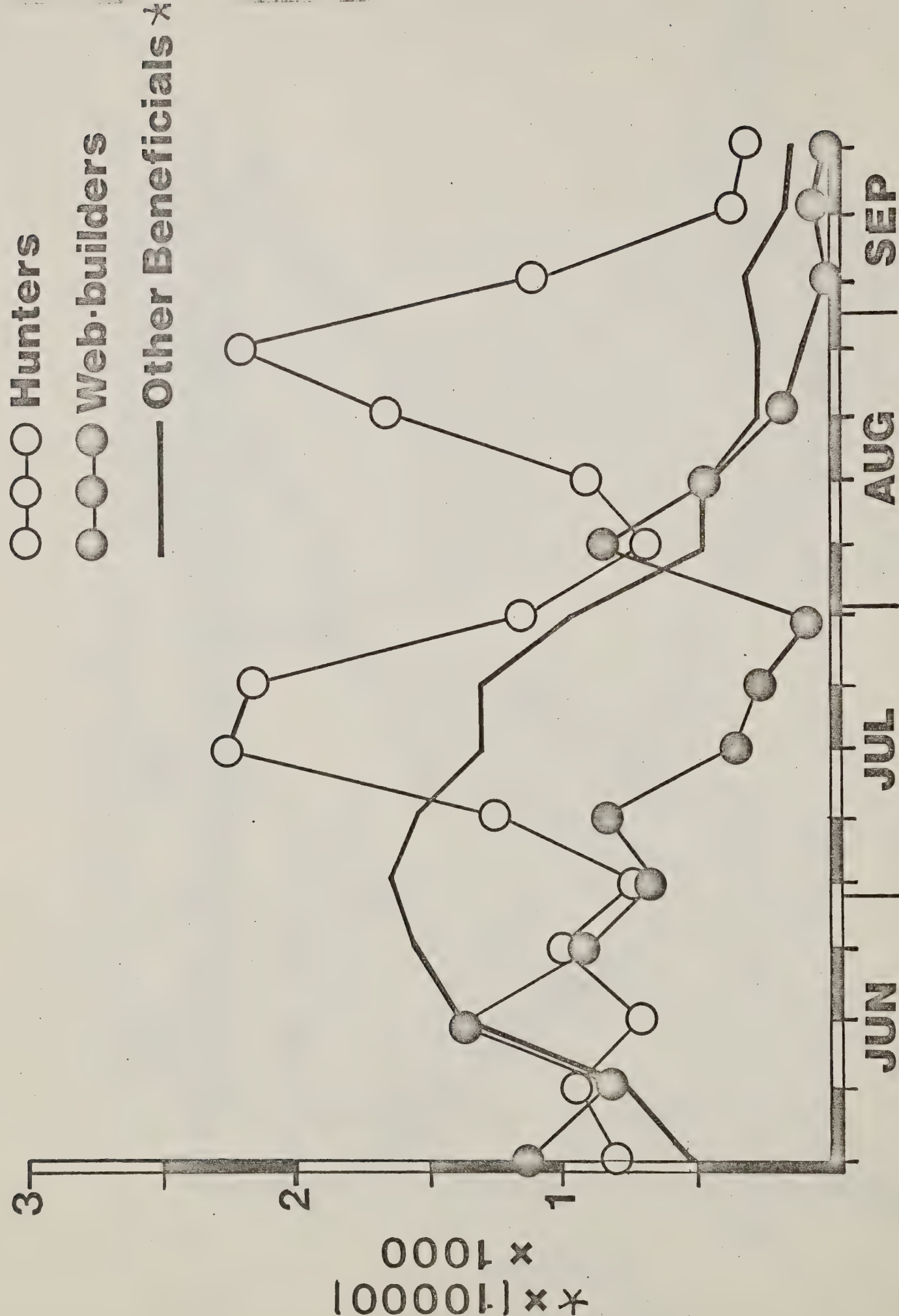


Fig. 72: - Populations of hunter and web-building spiders and other beneficial arthropods per acre based on D-vac samples in Pontotoc County, 1977.

Sampling Methods

Four methods were used for sampling arthropod populations monthly in the Boll Weevil Eradication and Optimum Pest Management Trials. The unit area sampler was used as the standard for comparing the efficiency of the other sampling methods. Two of the methods were the widely used sweep net and D-vac techniques. The fourth method consisted of field observations by an entomologist with wide faunal experience walking through the field and recording numbers and species of all arthropods observed.

The unit area sampler utilized a vacuum for collecting the insects. A portable air suction machine powered by a 3-hp gasoline engine provided the vacuum. The vacuum hose was inserted into a 3 x 3 x 3 ft aluminum frame cage with the top and 4 sides fitted with panels of clear Lexan®. Two opposite side panels had arm-holes fitted with plastic sleeves for manipulating the vacuum hose. The unit was moved by two persons who quickly placed the cage over the sample area. Once placed over the plants, all arthropods within the cage were removed by passing the suction hose over the entire surface of the plants, soil, and inner walls of the cage. The collection bags containing the samples were taken to the laboratory where specimens were placed in deep freezers and later separated from trash by hand, identified and counted under magnification. Ten unit area samples were taken on each date in each sample field.

At present, only the data from the D-vac sampling method been compared with the unit area sampling method. D-vac sampling was done with a 10-inch collecting cone. The plants were vacuumed from

1 side and from top to bottom while the operator moved along the row. Ten samples each consisting of 10 feet of row were taken in each field.

Results are presented as ratios. For example:

$$\text{Ratio} = \frac{\text{Estimated numbers of arthropods per acre collected by D-vac}}{\text{Estimated numbers of arthropods per acre collected by unit area sampler.}}$$

A ratio, consisting of total arthropods collected, is shown in Figure 73. Note that the variation in ratios in Mississippi from month to month was greater than in North Carolina, but the averages for the summer were the same, 0.59.

A selected ratio was calculated. This removed several numerous and less important species such as thrips, etc. from consideration. Figure 74 shows that these ratios are similar to the total arthropod ratios; 0.59 for North Carolina and 0.65 for Mississippi.

A beneficial arthropod ratio was then calculated using only those species known to be predaceous or parasitic, Fig. 75. The higher ratios strengthen credibility of the D-vac technique as a tool for sampling arthropod populations in cottonfields.

A ratio of faunal diversity, which consists of the number of different species collected by the two methods, is given in figure 76. Here, the Dvac actually out performed the unit area sampler with ratios of greater than one.

A summary of the various relationships is presented in figure 76.

Fig. 73 - Relationship of total arthropods collected with D-vac and unit area sampling methods in the Boll Weevil Eradication and Pest Management Trials. 1978

$$\text{RATIO} = \frac{\text{ARTHROPODS COLLECTED BY D-VAC PER ACRE}}{\text{ARTHROPODS COLLECTED BY UNIT AREA SAMPLER PER ACRE}}$$

**TOTAL RATIO
NORTH CAROLINA , 1978**

	FIELDS	SAMPLES	RATIO
JUNE	6	60	.64
JULY	6	60	.60
AUGUST	3	50	.47
TOTAL	<u>15</u>	<u>170</u>	<u>.59</u>

**TOTAL RATIO
MISSISSIPPI , 1978**

	FIELDS	SAMPLES	RATIO
JUNE	3	30	1.02
JULY	6	60	.39
AUGUST	6	60	.58
TOTAL	<u>15</u>	<u>150</u>	<u>.59</u>

Fig. 74 - Relationship of selected arthropods collected with D-vac and unit area sampling methods in the Boll Weevil Eradication and Pest Management Trials. 1978

**SELECTED RATIO:
NORTH CAROLINA**

	FIELDS	SAMPLES	RATIO
JUNE	6	60	.72
JULY	6	60	.52
AUGUST	<u>3</u>	<u>50</u>	<u>.44</u>
TOTAL	15	170	.59

**SELECTED RATIO:
MISSISSIPPI**

	FIELDS	SAMPLES	RATIO
JUNE	3	30	1.19
JULY	6	60	.36
AUGUST	<u>6</u>	<u>60</u>	<u>.66</u>
TOTAL	15	150	.65

Fig. 75 - Relationship of predacious or parasitic arthropod species collected with D-vac and unit area sampling methods in the Boll Weevil Eradication and Pest Management Trials, 1978.

**BENEFICIAL RATIO:
NORTH CAROLINA**

	FIELDS	SAMPLES	RATIO
JUNE	6	60	.68
JULY	6	60	.86
AUGUST	<u>3</u>	<u>50</u>	<u>.77</u>
TOTAL	15	170	.77

**BENEFICIAL RATIO:
MISSISSIPPI**

	FIELDS	SAMPLES	RATIO
JUNE	3	30	.91
JULY	6	60	.59
AUGUST	<u>6</u>	<u>60</u>	<u>.76</u>
TOTAL	15	150	.72

Fig. 76 - Relationship of numbers of arthropod species collected with D-vac and unit area sampling methods in the Boll Weevil Eradication and Pest Management Trials, 1978.

RATIO OF FAUNAL DIVERSITY:
TOTAL NO. OF SPECIES FROM D-VAC
TOTAL NO. OF SPECIES FROM UNIT AREA

RATIO OF FAUNAL DIVERSITY		
	NORTH CAROLINA	MISSISSIPPI
JUNE	1.20	1.33
JULY	1.40	1.10
AUGUST	<u>1.13</u>	<u>1.25</u>
TOTAL	1.46	1.14

Fig. 77 - Summary of relationships of total arthropods, selected arthropods, predaceous or parasitic species, and faunal diversity collected with D-vac and unit area sampling methods in the Boll Weevil Eradication and Pest Management Trials, 1978.

SUMMARY

$$\text{TOTAL RATIO OF } \frac{\text{D.V.}}{\text{U.A.}} = .59$$

$$\text{SELECTED RATIO OF } \frac{\text{D.V.}}{\text{U.A.}} = .62$$

$$\text{BENEFICIAL RATIO OF } \frac{\text{D.V.}}{\text{U.A.}} = .75$$

$$\text{FAUNAL DIVERSITY OF } \frac{\text{D.V.}}{\text{U.A.}} = 1.30$$

OPM Research Team Personnel

C. R. Parencia - Research Coordinator (one-half time)
W. P. Scott - On the ground operations (full time)
J. W. Smith - Beneficial arthropods (one-third time)
T. C. Lockley - Beneficial arthropods and draftsman (one-third time)

Temporary Personnel

Batesville

Roger Aven
Albert Barnett
Harris L. Bryan
James E. Gooch
J. C. Hudson
Henry Johnson
Gary Lambert
James B. McKibben
A. W. Massie
C. T. McLemore
D. J. Moore
Steven M. Potts
Dennis Smith
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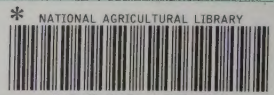
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David Young, H. C. Mitchell and Jim Hamer, Miss. Coop.
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